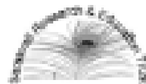
Vedic River Sarasvati
and
Hindu Civilization

Edited by
S. Kalyanaraman



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New Delhi



Sarasvati Research and Education Trust
Chennai

VEDIC RIVER SARASVATI AND HINDU CIVILIZATION

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Cover Illus.: Space image showing Sarasvati sarovar 80m X 80m at Ad Badri, north of Kapal Mochan, at the foothills of Siwalik mountain ranges.

Foreword

The hoary and sacred River Sarasvati played a great role in the simple lives of the Vedic people of India of the recent centuries. It was indelibly associated with the collective consciousness of the community, the precursor of the later Hindu civilization. The achievements of the people of the Sarasvati region were extraordinary. The great Vedas, the Vedic Sanskrit language and the cultural symbols, practices and achievements have formed a continuum over thousands of years.

It is in the fitness of things that erudite scholars from diverse fields of scientific knowledge came together in a Conference recently to exchange their knowledge and insights on different aspects of what is rightly known as Sarasvati River Civilization. The papers read and the discussions in the Conference should remove any lingering doubt on the reality of the great River Sarasvati. I do hope that those who have been propagating that Sarasvati was only a mythological river, and persisting with the colonial myth of "Aryan invasion", which has now turned into "Aryan migration", will turn a new leaf.

It is a matter of great satisfaction that thanks to the efforts in the State of Haryana, Sarasvati stands rejuvenated above the ground right into Rajasthan. Those who take pride in their civilizational identity will indeed be happy when the river finally joins the sea waters on the west of our country, after traversing through Gujarat. The ancient symbol will then once again acquire renewed significance in the memory and rituals of the people of the country.

I compliment and congratulate the organizers and sponsors of this Conference.

October 23, 2008 **Swami Dayananda Saraswati**

Preface

This compilation contains multi-disciplinary papers presented at the Conference held from Oct. 24 to 26, 2008 on 'Vedic River Sarasvati and Hindu civilization' based on researches and studies carried out during the last 50 years which throw a new light on the origins of civilization and accounts of a remarkable cultural continuum in India, exemplified by Hindu civilization as a linguistic area.

This work has to be read with a critical review of the work published in 2007 tracing, from a euro-centric indologist's perspective, the roots of Indo-European languages.

This presentation of an euro-centric view-point is intended to be a prelude to the presentation of an alternative view of the continuum of cultural traditions, evolution of languages in ancient India, thus challenging the received wisdom of euro-centric origins of Hindu civilization (as exemplified by the much-debated Aryan invasion/migration theories).

Search for European homeland has engaged many scholars for over 200 years; a 2007 account of main facets of this scholarship appears in a book by DW Anthony, *The Horse, the Wheel, and Language: How Bronze-Age Riders from the EurasianSteppes Shaped the Modern World,* Princeton University Press. A critique of this book appears elsewhere in this compilation.

24 October 2008

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Earth and Life-Sciences

1

River Piracy

Sarasvati that Disappeared

K.S. Valdiya

The legendary river Sarasvati, which flowed from the Himalaya and emptied finally into the Gulf of Kachchh, has vanished. Tectonic movements change river courses, behead streams and sometimes even make large rivers such as the Sarasvati disappear.

MIGHTY RIVER OF VEDIC TIME

There was this highly venerated river Sarasvati flowing through Haryana, Marwar and Bahawalpur in Uttarapath and emptying itself in the Gulf of Kachchh, which has been described in glowing terms by the *Ṛgveda*. "Breaking through the mountain barrier", this "swift-flowing tempestuous river surpasses in majesty and might all other rivers" of the land of the pre-Mahabharat Vedic period. More than 1200 settlements, including many prosperous towns of the Harappan culture (4600 to 4100 years BP) and *ashrams* of *rishis* (sages) lay on the banks of this life-line.

Where has that great river gone? It is today represented by the disproportionately wide and astonishingly water-less, sand-filled channels of Ghaggar in Haryana and Marwar, Hakra in adjoining Bahawalpur, and Nara in Sindh (Fig. 1). These channels, which discharge only floodwaters, are quite apparent in the Satellite imageries (Fig. 2).

The legendary Sarasvati was indeed a great river which rose in the Bandarpunch massif of the Great Himalaya in western Garhwal (Fig. 3A), flowed south-west ward through a channel past Adi Badri,

(Source: *Resonance*, May 1996, pages 19-26).

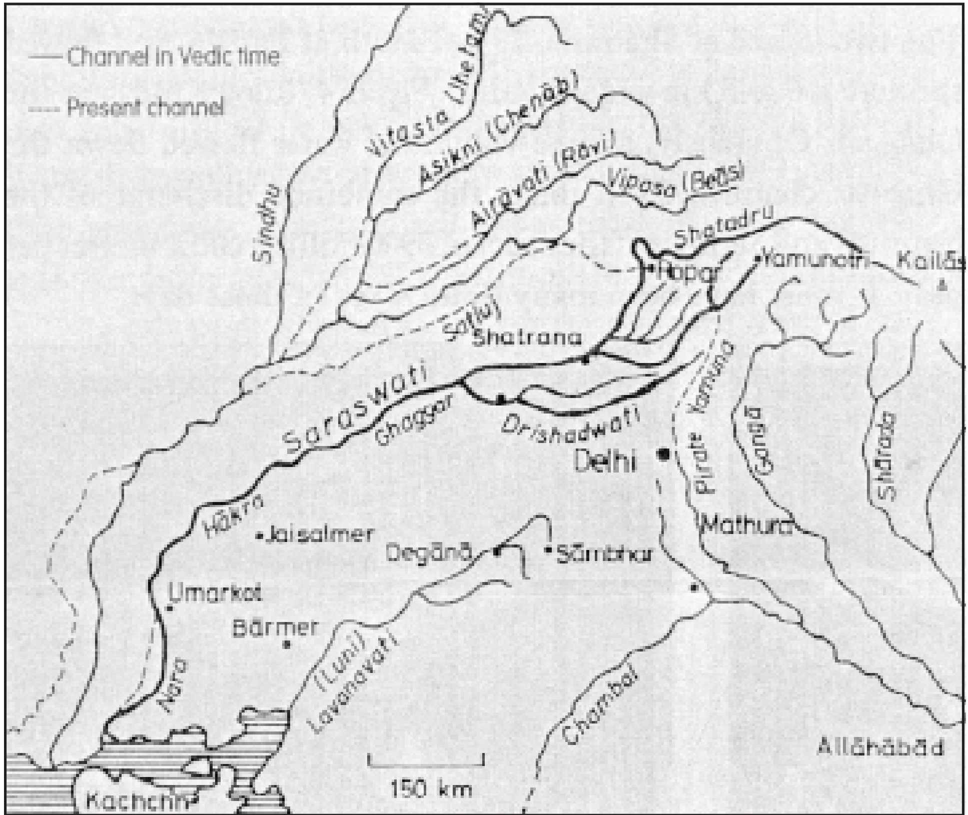


Fig. 1. Legendary Sarasvati of Vedic times was formed by the joining together of the Shatadru (Satluj) and what is today known as the Yamuna. The Aravali was not a highland but a thickly forested terrain sloping south-west wards.

Bhavanipur and Balchhapur in the foothills, and met the Shatadru or Satluj (which then veered towards the south-east). The Shatadru came from the region of Mount Kailash in southwestern Tibet (Fig. 3B). The ancient Sarasvati was thus formed by the confluence of what are today the Yamuna and Satluj rivers flowing in entirely different directions (Fig. 1). The two joined at Shatrana, 25 km south of Patiala, and flowed through a 6 to 8 km wide channel (Fig. 4) known today as the Ghaggar. Obviously, a large volume of water flowed down the Ghaggar channel. Even today the combined discharge of the Yamuna and Satluj is of the order of 2900 million cubic metres per year. It must have been many times more in those days.

The Ghaggar is known as Hakra in northwestern Marwar and Bahawalpur (Pakistan) and as Nara in Sindh, before it discharges into the Gulf of Kachchh. Drishadwati – now a dry channel called Chautang – joined the Sarasvati near Sirsa from the east (Fig. 1). It was at Kurukshetra in Manu's

Brahmavarta between the Sarasvati and the Drishadwati where the epic battles of Mahabharata were fought in the post-Vedic period.

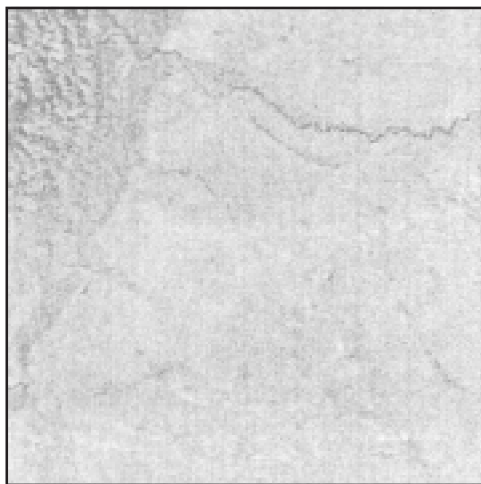
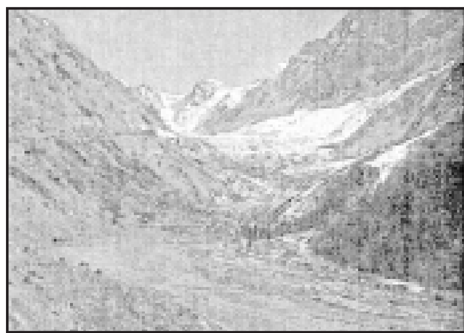


Fig. 2. Satellite picture of the Haryana-Punjab region, showing the disproportionately wide of the Vedic time Channels (with little or no water) abandoned by big rivers which have migrated to the east or west.

WETTER PERIOD IN MARWAR

Western Rajasthan – including the Thar tract – was a wetter region some 40,000 years ago. Periods of dryness alternated with phases of wetness. This is testified by pollen grains buried and trapped in the sediments of the Lunkaransar and Didwana lakes and by thermoluminescence of sands in dunes and floodplains. The Sarasvati and its tributaries held sway in the northern part, and the Lavanavati (Luni) had an organized drainage network of perennial streams in the southern part. It was in this well-watered, presumably fertile and congenial land of the Sarasvati, Drishadwati and Luni that the Stone Age people established their settlements (Fig. 5), and developed their Palaeolithic, Mesolithic and Microlithic cultures.

From 10,000 to 3,500 years BP, the climate was quite wet – the rainfall being almost three times what it is now (Fig. 6). This is indicated by the analysis of pollen (dominated by those of *Syzygium, Pinus* and *Astemisia*).



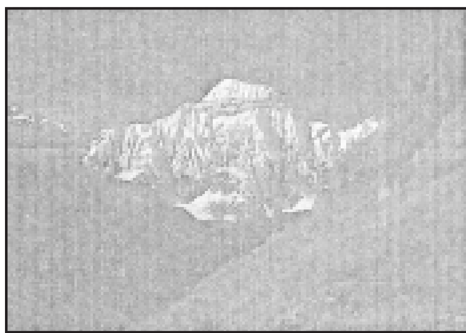


Fig. 3. (A left): Main confluent of the Sarasvati, what is today called the Tons branch of the Yamuna, springs from the Har-ki Dun glacier. (B right): Source of the other confluent of the Sarasvati, the Satluj lies beyond the Indo-Tibetan border range.

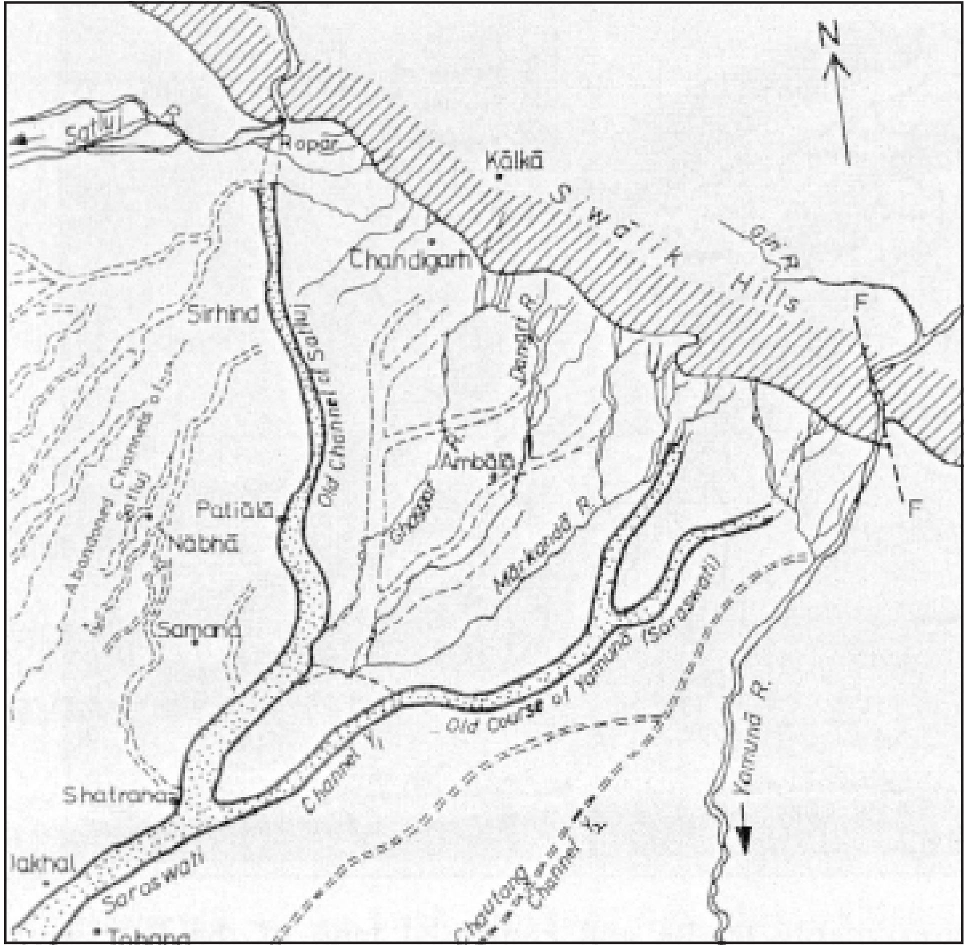


Fig. 4. Dry channels of the Ghaggar and its tributaries seem to have been the former courses of the confluents of the Sarasvati (Based on Yashpal *et. al.*, 1980).

Cutigens in pollens and fragments of charcoal of stubbles imply that these people had taken to agriculture 9,400 years BP in the area of the Lunkaransar and 8,000 years BP in the Sambhar lake tract. More than 75% of the 1,600 settlements of Harappan culture have been found in the valley of the Sarasvati, such as at Banawali and Kalibangan in the Ghaggar Valley and Ali Murad and Kot in the Hakra Valley. The Harappan Civilization, dating back to the period 4,600-4500 to 4,200-4,100 years BP, was spread over nearly 13 lakh square kilometre area, stretching from Sutkongedar in the west, through Mohenjo-daro in the west-northwest, Ropar in the north, Alamgir in the east, Sutkotri in the south to Lothal, Rangpur, Rojri and Dhaulavira in the south-west (Figs. 5 and 7). The older Harappan sites are concentrated

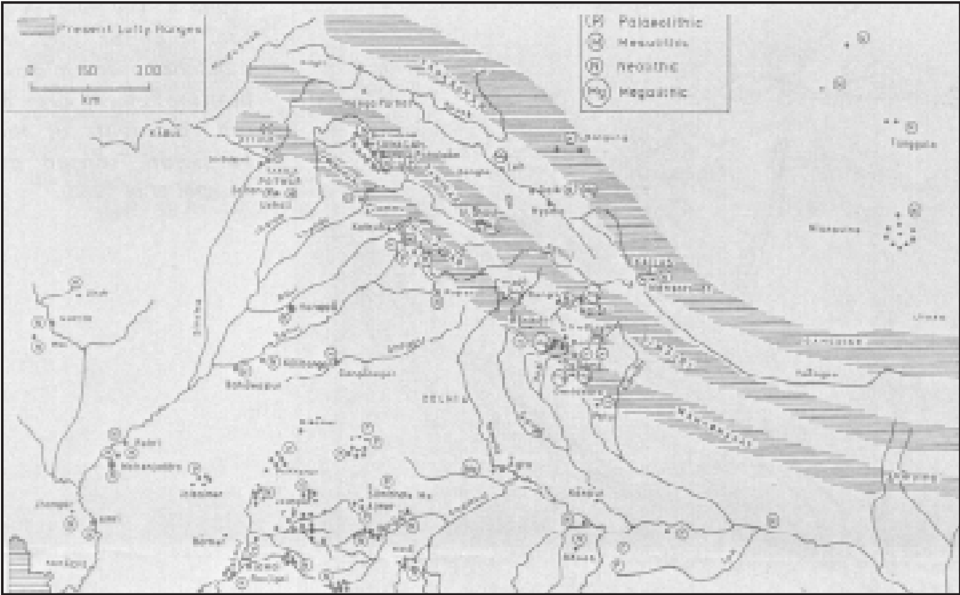


Fig. 5. Site of settlements of the Stone Age people in the Palaeolithic to Neolithic period (Based on V.N. Misra, 1995 and other sources).

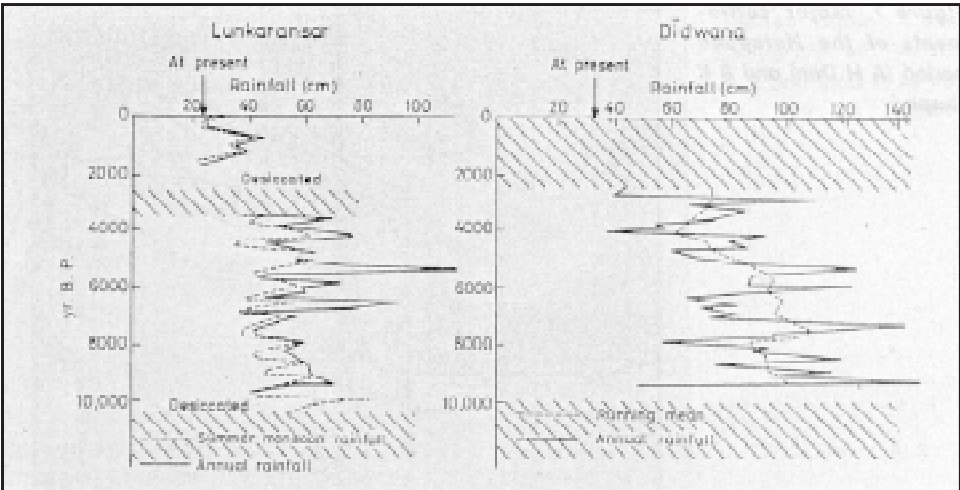


Fig. 6. Analyses of pollen buried with sediments in the Lunkaransar and Didwana lakes indicate according to Gurdip Singh and his colleagues (1974) – that in the period 10, 000 to 3,500 years BP Western Rajasthan used to have at least three times the rainfall that it has today.

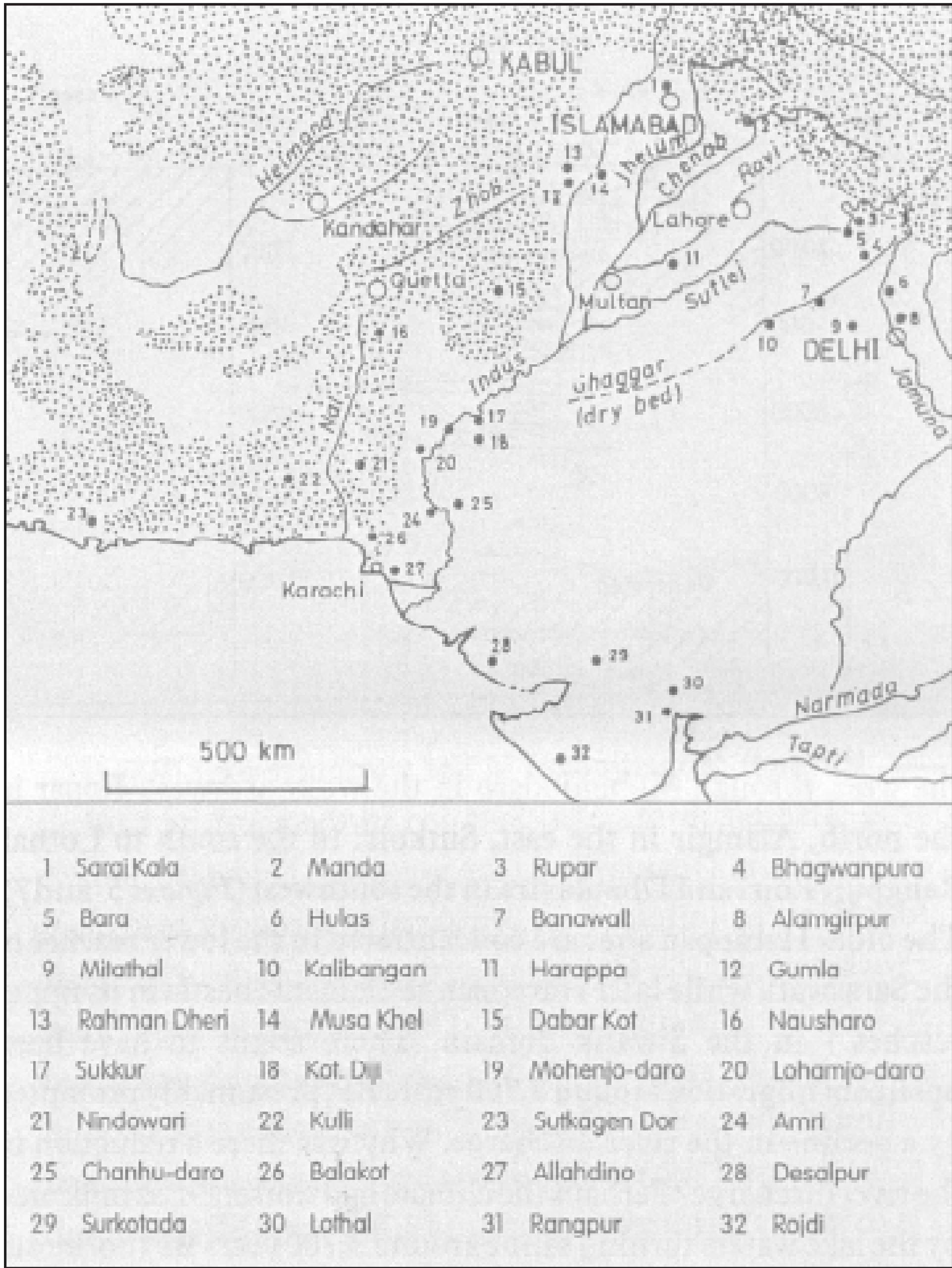


Fig. 7. Major Settlements of the Harappan period (A.H. Dani and B.K. Thapper).

in the lower reaches of the Sarasvati, while later Harappan settlements nestle in its upper reaches – in the Shiwalik domain. There seems to have been upstream migration around 3,700 years BP, presumably prompted by a decline in the river discharge. Why was there a reduction in the river discharge? Perhaps the climate had worsened, as indicated by the lake waters turning saline around 3,700 years BP (borne out by overwhelming appearance of halphytes among the aquatic flora of the lakes). Or, perhaps the Sarasvati had been robbed of its water.

GANGA STOLE AWAY SARASVATI'S WATER

Tectonic movements overtook the northern part of the Indian subcontinent, and the Aravali started slowly rising. The evidence for the continuing rise or uplift of the Aravali Range is quite striking. The western flank delimited by faults is marked by very steep straight scarps. The gently west-flowing streams draining the very old mature terrain of Mewar either descend suddenly in waterfalls, or flow through deep gorges and ravines in the western flank of the range. These streams are characterized by entrenched meanders and incised channels, and show development of uplifted terraces on their banks before abruptly swerving across the active faults.

The Sarasvati was forced to shift its course – progressively eastward. The Chautang channel (Fig. 1) possibly represents the course abandoned by the eastward migrating Sarasvati. Uplift of the Aravali domain accentuated the pace of erosion of the terrain. Consequently, a branch of the Chambal River started cutting its course northwards by headward erosion. It cut the channel deeper than that of the Sarasvati (Fig. 8), and thus beheaded the Sarasvati. During rains, the floodwater of the Sarasvati rushed into this new channel (later to be called Yamuna) culminating in the capture of the Sarasvati by the Chambal, the southwestern tributary of the Ganga. This was a case of river piracy, resulting from accelerated headward erosion, which in turn was prompted by tectonic uplift of the terrain. Thus, the Ganga had robbed the Sarasvati of the major portion of its water through the agency of a branch of its tributary, the Chambal (Fig. 8).

The reduced flow in the Sarasvati, coupled with the onset of dry climatic conditions over western Rajasthan, forced the Harappans to migrate upstream and settle down in the foothills of the Siwalik domains. This must have happened about 3,700 years BP. The *Markandeya* and the *Varaha Puranas* tell us that the Sarasvati was in decline during the Mahabharata time. Sage Manu states that the Sarasvati vanished in the sand at Vinasan, near Sirsa. There is allusion to the disappearance of the river in 'Van Parva' of the *Mahabharata*, and also in the *Siddhant Shiromani*.

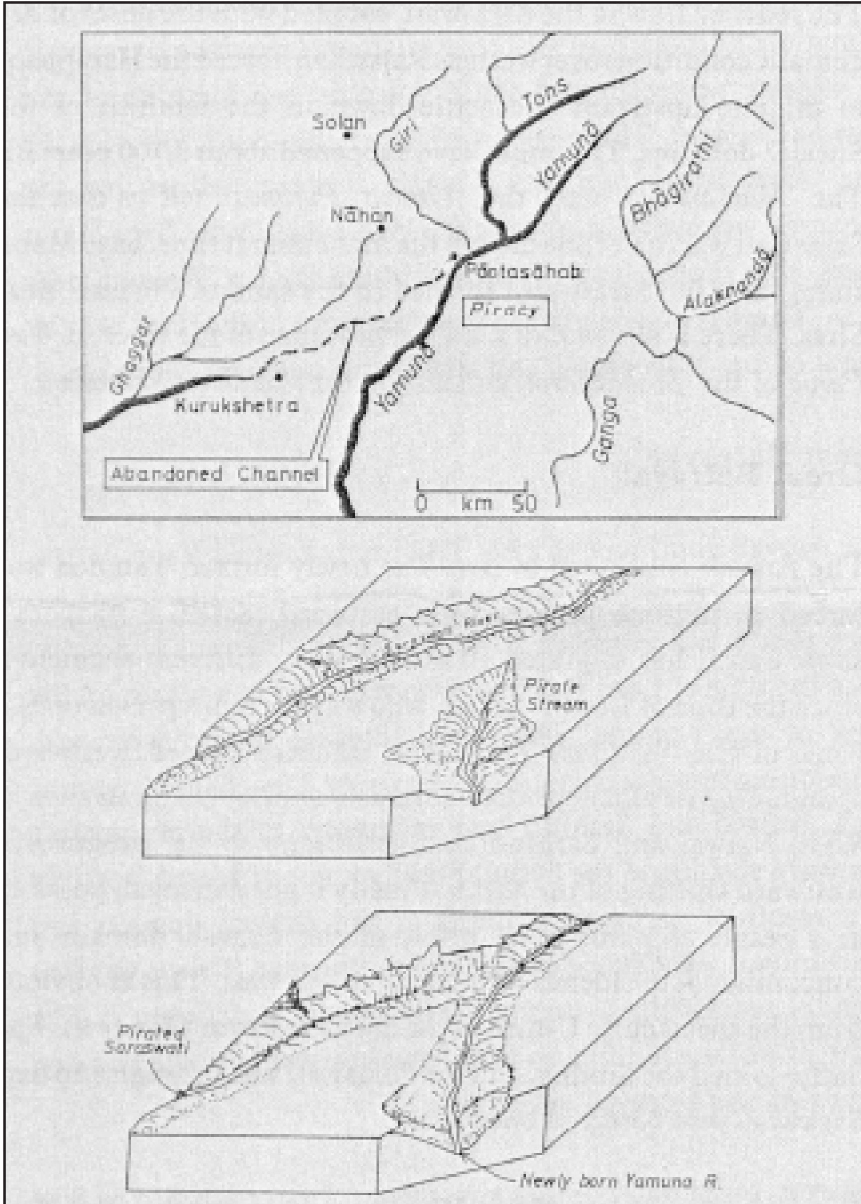


Fig. 8. A south-flowing branch of the Chambal (the southwestern tributary of the Ganga) cut its channel headwards and captured the water of the then south west flowing Sarasvati. The new channel, through which the diverted water flowed, was later named Yamuna. Map shows the drainage pattern after this river piracy – after the Sarasvati was robbed of its water by the Ganga through the agency of its tributary.

GREAT BETRAYAL

The Aravali continued to rise. The newly formed Yamuna was forced to migrate progressively eastward. Satellite imageries show that it has migrated 10 to 40 km (in different segments) since the time of Lord Krishna, who was born in a prison on the bank of the Yamuna. The Satluj likewise moved westward, abandoning its older channels successively. Dry channels such as Wah, Naiwal and Sarhind bear testimony to the progressive westward shifting of the Satluj. Finally it got deflected, possibly as a result of

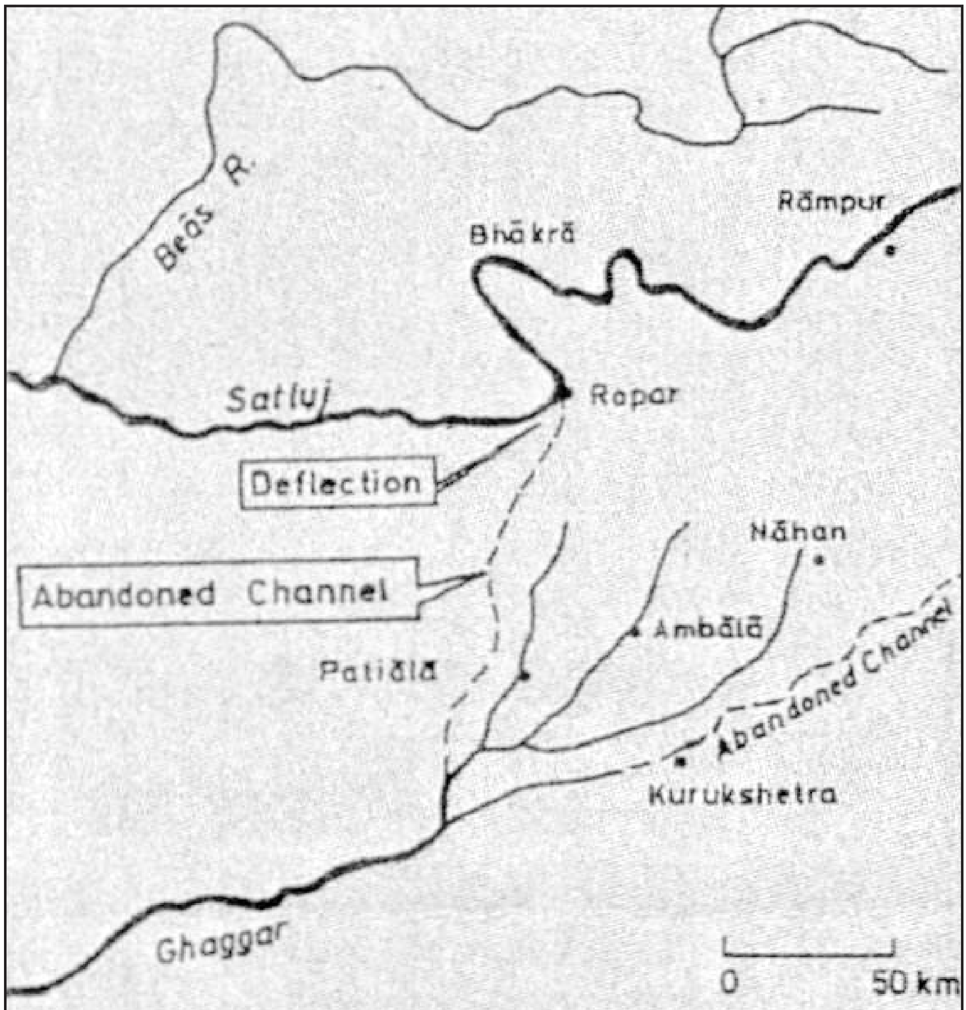


Fig. 9. When the Aravali rose, and as the land to the west sank, the Satluj charged its course abruptly, making a sharp U-turn at Ropar.

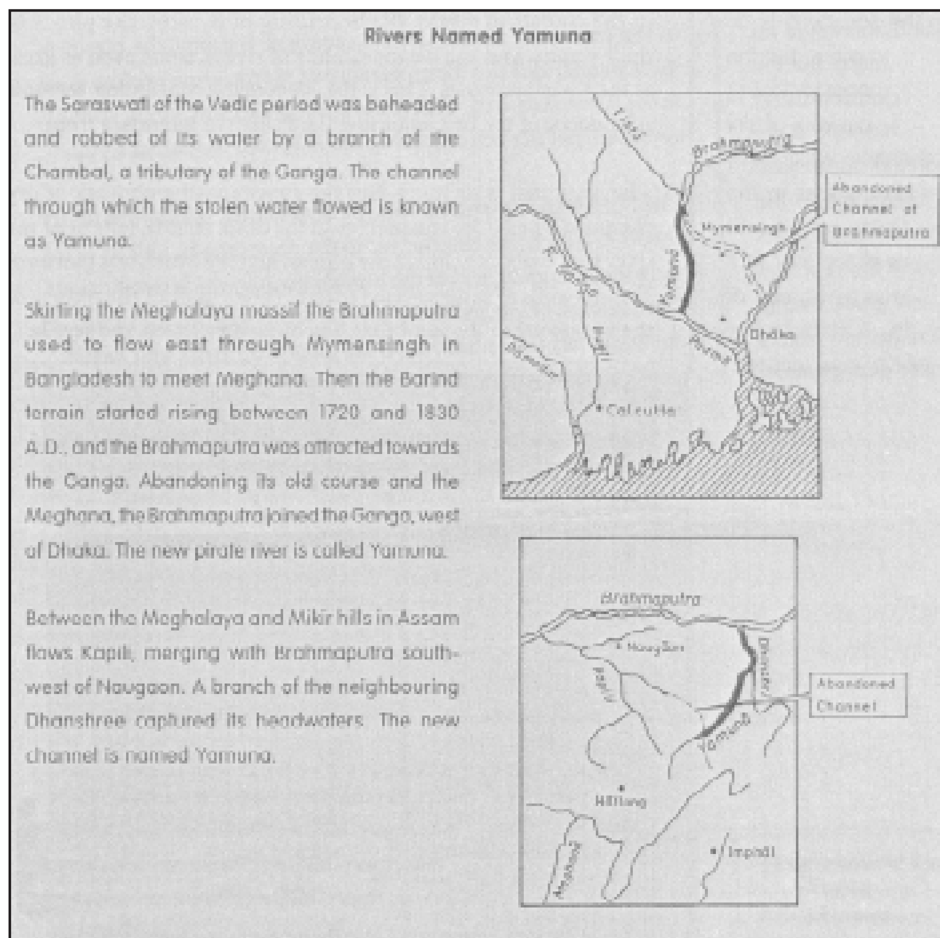


Fig. 10. In Assam and Bangladesh, as in Haryana-UP, the channel through which river piracy occurred, is named Yamuna.

paroxysmal uplift of the Aravali domain and concomitant subsidence of the land to the west. This is obvious from the spectacular U-turn of the Satluj at Ropar (Fig. 9). The Satluj joined the Sindhu, and the Sarasvati was left high and dry Sarasvati was betrayed once again.

However, some water of this Himalayan river continued to flow into the Hakra-Nara channel until about AD 1245, when there was a great migration of the desert people out of the region. The Satluj finally ceased to contribute water in AD 1593, when it changed its course finally and decisively.

Deprived of the waters of the two snow-fed rivers (Yamuna and Satluj), the Sarasvati was reduced to a puny river, left with the waters of the petty streams rising in the Siwalik domain – Wah, Ghaggar, Dangri, Markanda,

Sarsuti, etc. Only flood waters flowed down the large channel that was once the mighty Sarasvati.

Western Rajasthan gradually turned into a parched land of moving sands. It was not only the Satluj that was moving westwards. Indeed, all the rivers of the Sindhu system – including the Asikni (Chenab), the Vipasa (Beas) and the Sindhu itself – have been shifting perceptibly. The Sindhu migrated 160 km westwards in historical times. It appears that the uplift or rise and subsidence or sinking of the ground resulting from crustal movements causes changes in the courses of rivers, the beheading of streams, the piracy of their waters, and the disappearance of rivers, some even as great as the river Sarasvati. This is the effect of the continuing tectonic subsidence of the belt adjoining the Pakistani mountain front. The Sarasvati is no more. But the anastomosing network of dry channels which lose themselves in the desert sands, tells us of the river that was great, and of the human history which was glorious. The network of canals across several states implies the return of the Sarasvati to the land that was once very green and fertile.

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2

Vedic Sarasvati: Scientific Signatures on its Origin from the Himalaya

V.M.K. Puri

INTRODUCTION

Whenever one ponders over ancient river systems of India, only three rivers emerge in Hindu ethos, viz., Ganga, Yamuna and Sarasvati. Nevertheless, Sarasvati is celebrated all over the country in different forms. It is a river, the best of rivers, *Naditame*. She is the mother in whose lap a civilization was nurtured. She nourished the people living on its bank, *Ambitame*. She had attained the status of a divinity even in the days of *Ṛgveda*, *Devitame.*

In Vedic geography, there is a mention of *Sapta Sindhu*, i.e., seven rivers in which Sarasvati attains an important description (Fig. 1). Most of these rivers exist even today except Sarasvati which has disappeared completely. Those scholars who question the antiquity of Hindu civilization even doubt the existence of Sarasvati in India. Nevertheless, recent scientific studies in this connection have revealed data to irrefutably prove that Sarasvati did exist in India as described in *Sapta Sindhu* in ancient scriptures. In this connection, contributions of modern scientists like Drs. S.S. Merh, B.P. Radhakrishna, Baldev Sahai, K. Kasturirangan, S.L. Rao, B. Shashishekharan, S.P. Gupta, B.B. Lal, Shivaji Singh, Narhari Acher, S. Kalyanaraman, K.S. Valdiya, etc. is duly acknowledged. The term Sarasvati has been very loosely used to describe more than 30 channels that are located in different and unrelated areas like Badrinath in Himalaya to West Bengal in the east and elsewhere in India. Therefore, the term Vedic Sarasvati is used to designate the mighty river that had existed in north-west India that finds its reference in *Sapta Sindhu.*

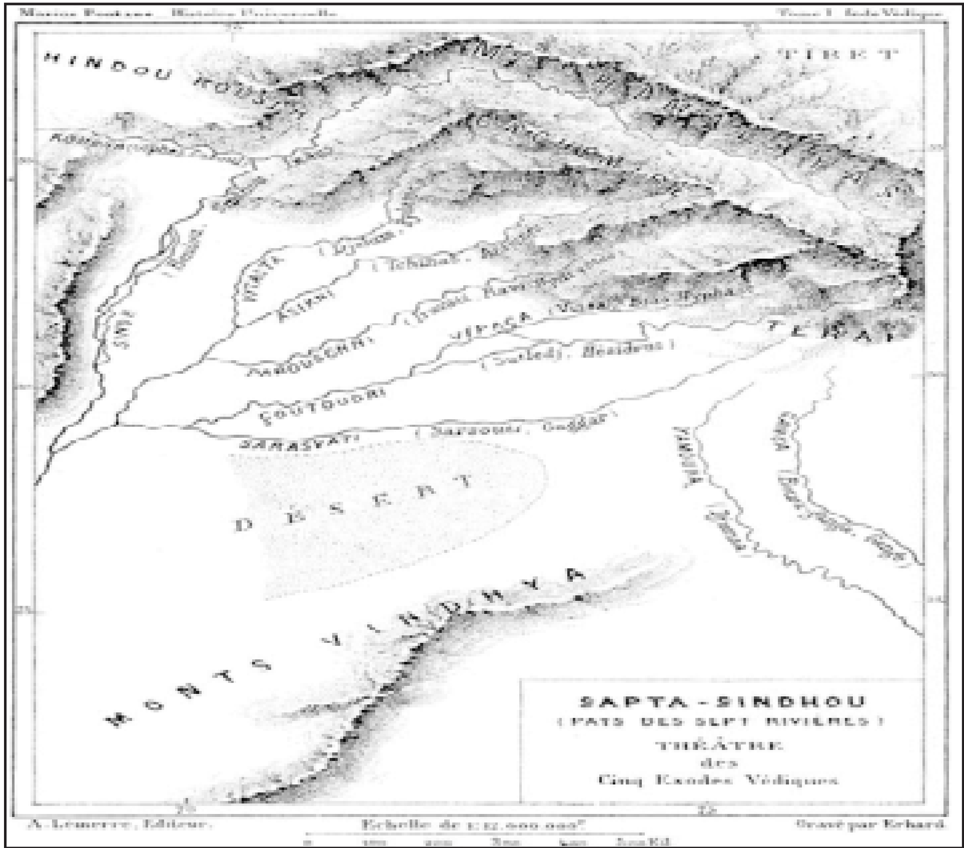


Fig. 1. Map of *Sapta Sindhu* (Nation of Seven Rivers), Marius Fontane, 1881; Histoire Universelle, Inde Vedique (de 1800 a 800 av. JC) Alphonse Lemerre, Editeur Paris.

Vedic Sarasvati was a gigantic river system that originated from Himalaya,[1] entered the plains and flowed in southwesterly direction through present day Haryana, Punjab, Rajasthan and Gujarat before joining the Arabian sea. This river was mightier than present day Brahmaputra and Ganga. Ancient Vedic Civilization flourished along its banks and important cities like Kurukshetra, Shatarna, Sirsa, Kalibangan, Banawali, Rakhigarhi, Pilibanga, Suratgarh, Lothal, Dholavira, etc. flourished along this mighty river. Nevertheless, it was a lifeline of northwestern and western India.

It is, therefore, natural that this river is adored in *Ṛgveda* in 72 *richa* (verses) and other later scriptures. In *Ṛgveda*, this river has been described as supreme[2] amongst all other rivers, as a swift and violent[3] river that possessed enormous discharge responsible for causing massive floods on a

large scale.[4] In *Mahabharata*, this river has been described to follow a course towards the sea.[5] With passage of time, it became extinct – the only major river in northern India to suffer such an unfortunate fate. At present, only its fossil valleys have been deciphered at numerous locations whereas it has become a seasonal river in some other areas.

PERENNIAL SOURCE OF VEDIC SARASVATI

A mighty river of the magnitude of Vedic Sarasvati must have a perennial source. This source should be in a position to provide a continuous supply of water from a permanent reservoir to the river system. Such reservoirs do exist in Himalaya in the form of glaciers which cover nearly 9.3% of its total area. A glacier is a mass of snow and ice that flows due to gravity (Puri and Siddiqui, 1966)[6] and occupies a U-shaped valley. The glacier terminates where melting processes make it impossible to survive. A melt water channel flows out from its terminus. This melt water channel develops into a river system due to contributions downstream from other tributary glaciers lying in the same basin. Consequently, this river system acquires a perennial nature (Puri and Shukla, 1996).[7] Therefore, any perennial river must originate from a glacier or a glacier system that is bound by a well-defined basin. It is quite logical to conclude that even Vedic Sarasvati had a glacier-fed source and it was a perennial river system.

India is located in a tropical region but temperate like conditions do exist in high altitude areas in the Himalaya. High relief causes accumulation of snow and ice that in turn give rise to glaciers. In the past, these glaciers had descended to still lower elevations in Himalaya due to cooler climate caused by Pleistocene (Berggren, 1995)[8] Ice Age. These bodies have left behind their signatures implanted on topography (Puri *et al.*, 1996).[9] Therefore, the surmise of *Rishi* pertaining to the origin of Vedic Sarasvati from Himalaya (*Ṛgveda*, *op. cit.*) is correct since glaciers are restricted to the Himalaya only.

CRITICAL BASIN IDENTIFICATION IN HIMALAYA

Even a casual glance on a map depicting present day rivers of northern India will reveal two clearly identifiable and distinct river systems. The first belongs to the Indus system that flows towards the Arabian sea and the second to the Ganga system that flows towards the Bay of Bengal; the latter encompasses the Brahmaputra also. Moreover, a critical zone exists in northern India which is drained by the Yamuna River. It flows in a very peculiar manner after entering the plains near Kalesar (Haryana). Its course is almost southerly and it gradually swings eastwards and joins the Ganga

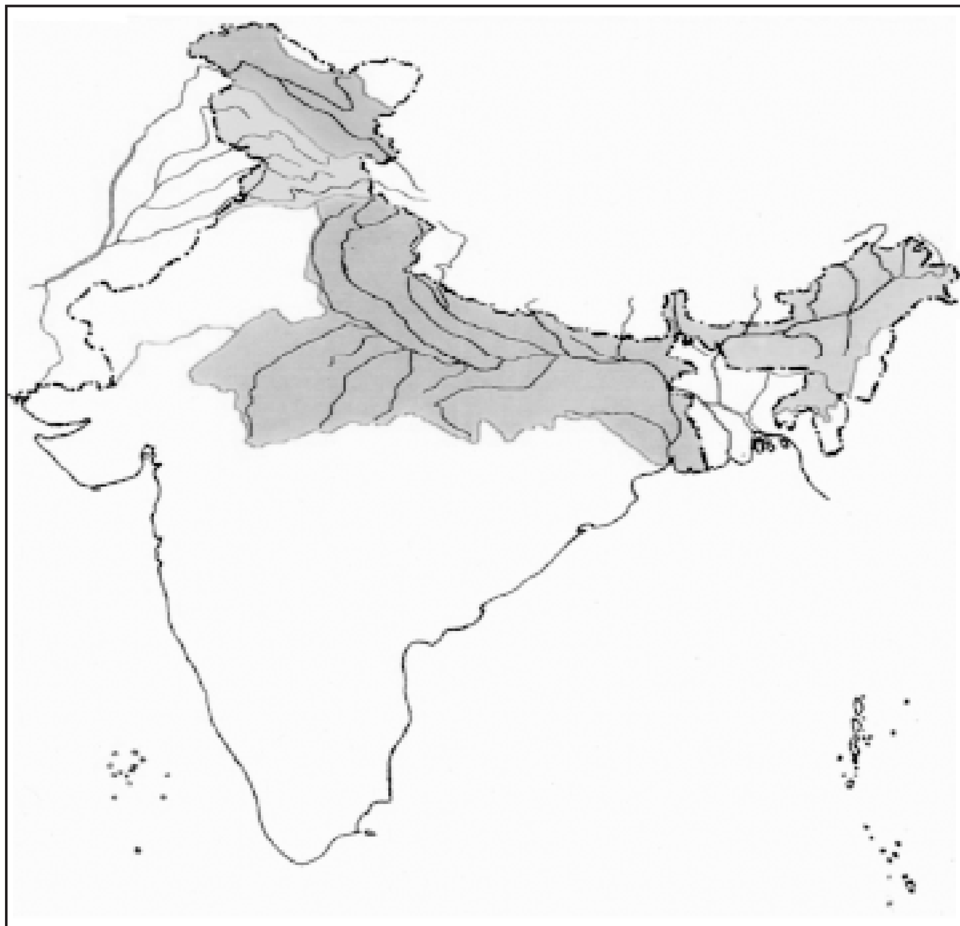


Fig. 2. Second order basins of Indian Himalaya.

on its southern bank at Allahabad. Geological studies have indicated that migration of the Yamuna River towards east is still continuing today. This anomaly in distribution pattern in rivers of northern India is very significant and deserves closer scrutiny.

Compilation of glacier inventory was taken up as a global project under the aegis of International Commission of Snow and Ice (ICSI.) and UNESCO. Consequently, a Temporary Technical Secretariat (TTS) for World Glacier Inventory (WGI.) was established at Zurich. The main objective of this endeavour was to attain uniformity in data collection in science of snow, ice and glaciers all over the world. Therefore, the TTS delineated various mega river basins in the world in a specified sequence called 'order' and issued appropriate guidelines for data compilation (Muller *et al.*, 1977).[10]

The TTS for WGI followed inverse Strahler order (commonly used in basin analysis conducted in geomorphologic observations) for demarcating various stream orders of the world. Thus, a base map on 1:20 Mio scale was compiled in which first to fourth order basins were identified. Here, stream and basin orders are used as synonymic terms since stream is always delineated by a basin.

As per the base map of the TTS for WGI for India, only two first order basins encompass the entire Himalaya and north Indian sub-continent, viz., the Indus and the Ganga (Fig. 2). The Indus First Order Basin contains only 2 Second Order Basins, 5 Third Order Basins, 13 Fourth Order Basins and 87 Fifth Order Basins. On the other hand, the Ganga First Order Basin comprises 2 Second Order Basins, 5 Third Order Basins, 23 Fourth Order Basins, and 42 Fifth Order Basins. The Fifth Order Basins were computed by Glaciology Division, Geological Survey of India.

The critical zone in which present day Yamuna migrates lies at the conjunction of Bhagirathi Fourth Order Basin towards east and Satluj Fourth Order Basin in the north and the west. The encompassing basin is the Yamuna Fourth Order Basin. It is the most critical basin in which the fossil valleys of Vedic Sarasvati are located and deserves a close study and analysis. In other words, the target basin is located in juxtaposition to Ganga First Order Basin in the east and the Indus First Order Basin in the west and northwestern areas.

YAMUNA FOURTH ORDER BASIN

This basin is located in present day eastern part of Himachal Pradesh and western Garhwal Himalaya of Uttaranchal. Six rivers drain this basin but in a very peculiar manner, i.e., in an anti-clockwise disposition. A brief analysis of glaciation in this basin deserves special consideration.

GLACIATION: PRESENT AND PAST

A. Impact of present day glaciation: Amongst the catchment area of six river basins of higher Fifth Order Basins in Yamuna Fourth Order Basin, the largest basins, viz., Tons and Yamuna merit special attention from geomorphologic point of view. Markanda catchment (yet another higher order basin) has a different (westerly) orientation whereas that of remaining five basins converges towards Paonta Doon north of Siwalik belt. Out of these six catchment areas, the present day glaciers are restricted to only Tons Fifth Order Basin while the remaining ones are devoid of it. The only other potential basin that could hold glaciers is Yamuna Fifth Order Basin but surprisingly no glaciers are found even though its northwesterly

extremity is conducive to glaciation. However, the main reason for the absence of glaciers in remaining other four basins is that topographic elevations and catchment configurations are such that these bodies cannot exist under the present day climatic conditions.

In Tons Fifth Order Basin, the glacierised area is 152.19 sq. km, which works out to be 3.2% of the total basin area. The estimated water content locked up in this basin has been calculated to be 6840 million cubic metres of water equivalent (W.eq). The largest glacier in the basin is Banderpuch, which is a 9 km long transverse valley glacier having northwesterly orientation. The river *Tamas* or Tons emerges from its snout as melt water channel and continues to grow as the largest drainage in entire Yamuna Fourth Order Basin whereby its daily discharge (Q) is almost equal and sometimes exceeds the combined daily discharge of the Aglar, Yamuna, Giri, Bata and Markanda rivers. It is striking to record that a linear relationship between the glacierised area and summer mean daily discharge has been established in some of the Himalayan basins (Puri and Swaroop, 1996).[11] Hence, contrary to expectations, it is the Tons and not the Yamuna River that is responsible for major contribution to the nourishment of Yamuna Fourth Order Basin due to the presence of present day glaciation conditions in Tons basin.

B. Palaeo-glaciation in Yamuna Fourth Order Basin: Glaciers, at present, are in a state of recession with a few exceptions in Himalaya. However, these glaciers had occupied much lower elevations on this mountain system as compared to the present day heights during prime of glaciation in Pleistocene Ice Age. With emergence of warm phase of climate, i.e., inter-glacial period, glaciers started retreating at a faster rate. These bodies have left distinct signatures implanted over the terrain. A general discussion on palaeo-glaciation in Himalaya is beyond the scope of this paper. Nonetheless, it will suffice to mention that glaciers had descended in Himalayan terrain almost up to 5000 ft elevation during prime of glaciation. It is quite possible that glaciers might have descended to still lower elevations (as in Kangra Valley) but all such signatures have been obliterated now.

In Yamuna Fourth Order Basin, palaeo-glaciation limits have been identified based on geomorphologic and glaciological parameters. In southern Yamuna Fifth Order Basin, the palaeo-glaciated area is 609.38 sq. km which is 27.5% of the total basin area but at present no glaciers are found in this basin. Hence, it is estimated that 1, 09,620 million cubic metres of water (W.eq.) has been released that was locked up in the glaciers of past. On the other hand, in northern Tons Fifth Order Basin, 1713.13 sq. km

area was covered by glaciers during prime of glaciation, which accounts for 35.13% of the total basin area. The estimated water content (in terms of W.eq.) stored in the basin was 3, 08,340 million cubic metres. As mentioned earlier, present day stored water content is merely 6840 million cubic metres. Therefore, 96.8% of stored water in the form of glaciers during Pleistocene Ice Age has already been released from the basin. In other words, the glacier area vis-á-vis total basin area of Tons Fifth Order Basin has shrunk from 35.13% to 3.12% during the corresponding period.

It is quite striking that such a large estimated quantity of water has already been released from Yamuna Fourth Order Basin since the last Ice Age. The above estimates do not account for monsoon precipitation and winter liquid precipitation from western disturbance during the past humid phase which is now extremely difficult to measure. As per present day scientific experience, a factor of 2.5 can be applied to arrive at a workable figure. Consequently, water released in the past would work out to be 1.0278 billion cubic metres from a basin area of 7090.45 sq. km. In other words, 145 million cubic metres has been released per sq. km. of Yamuna Fourth Order Basin.

The important parameters are summarized below in a tabular form:

Table: Glaciological Parameters in Yamuna Fourth Order Basin

Parameters	*Tons Fifth Order*	*Yamuna Fifth Order*
Basin area (km^2)	4876.7	2213.75
Present day glaciated area (km^2)	152.19	-
Estimated water stored in present day glaciers ($10^6 \times m^3$)	6840	-
Palaeo-glaciated area (km^2)	1713.13	609.38
Estimated water content stored in the past ($10^6 \times m^3$)	3, 08,340	1, 09,620

Estimated water released – 145×10^6 m^3 per sq. km basin area

GEOMORPHIC ANALYSIS

A. Drainage Analysis: The peculiar drainage pattern of Yamuna Fourth Order Basin around Paonta Doon area requires a brief discussion:

Bata River – It is the smallest river in the entire basin and originates from Thandoi RF as a consequence of three seasonal channels. It flows towards south and swings to east and later follows southeastern direction before joining the Yamuna River (in Yamuna tear), 6 km south west of Paonta. The river valley is very wide and it hardly contains any discharge in it.

Markanda River – It originates from a distinct catchment around Nahan in Siwalik hills, flows westwards for almost 25 km and swings south-southwestwards. It cuts across the Siwalik belt and enters the plains near Kala Amb and continues to follow almost southwesterly course in Haryana.

Giri River – It originates from Shimla-Narkanda divide which is a non-glaciated catchment and flows initially in south-southwesterly direction. Subsequently, it takes a southeasterly course and joins the Yamuna River, 5 km north east of Paonta.

Tons River – It initiates as a melt water channel of Banderpuch glacier and flows towards south west for nearly 75 km to Pabbar confluence (a major right bank tributary). Thereafter, it acquires almost southerly course till it joins the Yamuna (flowing in westerly direction) near Kalsi, again in Paonta Doon.

Yamuna River – It originates from Yamunotri area in a high altitude region from a non-glaciated source at present. It flows in almost southwesterly direction in Paonta Doon and enters plains cutting across Siwalik belt at Kalesar through Yamuna tear fault. This drainage flows almost westwards in Paonta Doon and occupies a massive valley that contains a thick pile of sediments.

Aglar River – It originates from Dhanolti area of Mussoorie hills from a non-glaciated source and flows in west-northwest direction. It joins the Yamuna River east of Paonta in Paonta Doon.

The Aglar, Yamuna and Giri rivers meet together at Dhalipur, east of Paonta whereas the Tons joins the Yamuna, 17.5 km north of Dhalipur at Kalsi. On the other hand, the Markanda and Bata rivers flow in almost opposite direction. The Bata River is a remnant of ancient drainage that had been captured at a later time thus reversing its flow direction. Moreover, all the rivers except the Markanda join one another in Paonta Doon area. Yamuna, Bata and Markanda rivers occupy very large respective valleys but contain very low discharge. These rivers can be safely said to be misfit ones.

B. Terrace Evaluation: Paonta Doon lying north of Kalesar in Siwalik belt needs careful examination as it acquires a geomorphologic peculiarity. Five drainages as mentioned above are oriented in anti-clockwise disposition from their respective catchments and converge in this area (Fig. 6). It is situated over a thick pile of sediments and the drainage here acquires a considerable width. The elevation difference between Paonta and Kalesar – a stretch of nearly 10 km – is hardly 12 m (40 ft). In this valley, sediment pile is very thick and one gets the impression that present drainage is absolutely a misfit in Paonta Doon area. In other words, it is quite clear that

a major drainage was flowing in this area that has brought down this huge pile of sediments.

Verma (1971- 74)[12] carried out geological mapping of the area between rivers Markanda and Yamuna. Apart from mapping various elements in Siwaliks, he mapped four generations of terraces in the area. It is quite logical that the oldest terraces are located at the highest elevations in the valleys. Important oldest terraces are enumerated below:

Discovery of Adi Badri Terrace (Figs. 3 & 4) is a recent discovery by the author in Adi Badri area, located just south of Siwalik hills, almost 30 km north of Jagadhri. A pit was excavated in the oldest terrace on the western bank of Somb River by Archaeological Survey of India who designated it as Pit-3 (Fig. 5). It exhibits angular-shaped pebbles of high grade metamorphic rocks and quartzite embedded on the wall of the aforesaid pit. This alien lithology generated tremendous interest as this terrace is situated south of Siwalik hills in Haryana plains.



Fig. 3. Adi Badri showing old temple in foreground. Somb River drains the area. Old terrace in the upper portion excavated by ASI.

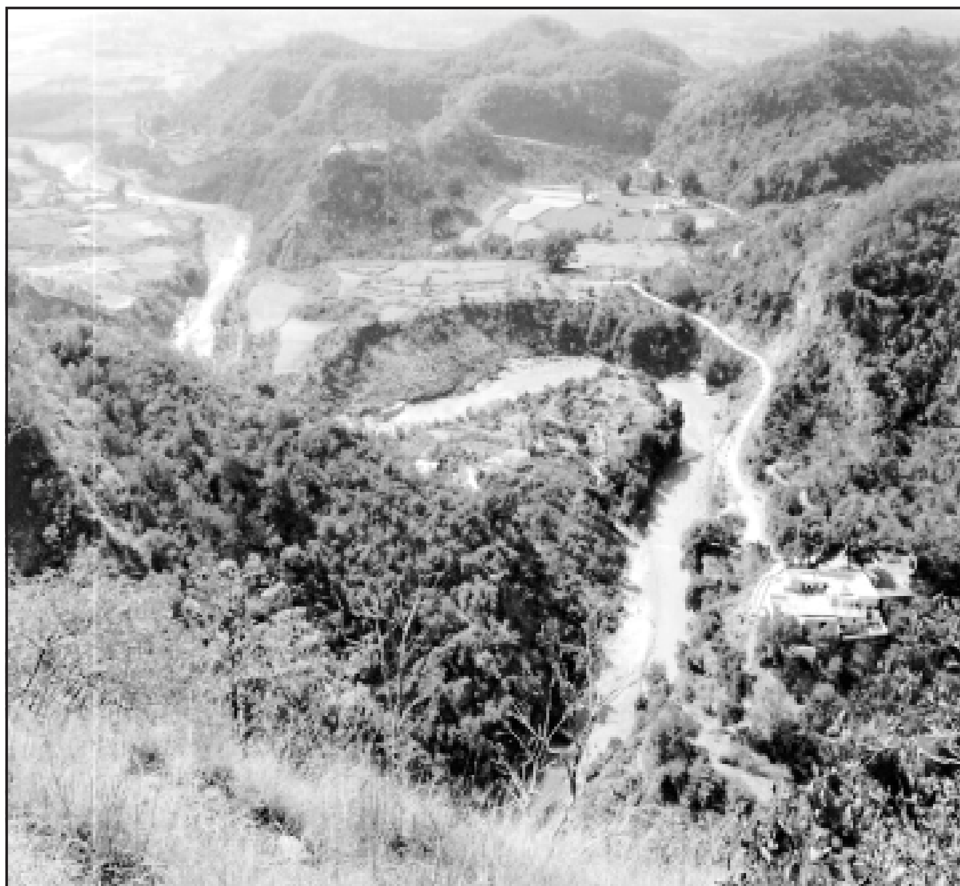


Fig. 4. Oldest terraces in Yamuna Fourth Order Basin and Yamuna Tear Fault showing displacement of the Siwaliks in the centre.

Sudanwala Terrace: The discovery of Sudanwala constitutes a major breakthrough in delineating the course of Vedic Sarasvati. It contains a signature of this river that is masked now. This terrace is located 2 km S 10^{o} E of Sudanwala and nearly caps the top of Siwalik hill. Average elevation of this terrace is 660 m (2178 ft) above mean sea level. It is oblong shaped and possesses almost horizontal disposition. Constituent pebbles of this terrace consist of different lithological composition but quartzite and metamorphic material are prevalent (Fig. 6).

Bata Terrace: It is located almost linear in shape on the slopes of the Bata River. This terrace is now dissected at a number of places due to development of younger channels and trends in almost WNW – ESE direction. Here also, pebbles of above-mentioned lithology are very common.



Fig. 5. Close view of Adi Badri terrace.

Garibnath Terrace: This terrace is situated in the most strategic position in Paonta Doon and lies NNE of Paonta. It is spindle shaped and trends in almost N 15° E-S 15° W direction. The elevation difference from the terrace top (594 m) to present river bed (408 m) is 186 m (614 ft). Most of the pebbles found in this terrace are from metamorphic and quartzitic rocks.

Markanda Terrace: This terrace occurs in a linear shape on the southern slope of the Markanda Valley, lying ESE of Nahan. It is also dissected by recent channels. The percentage of quartzitic and metamorphic rocks as pebbles is very high.

CONCLUSIONS

The present day provenance of the Bata, Markanda and Adi Badri consists of Siwalik rocks and it should have deposited pebbles belonging to rocks

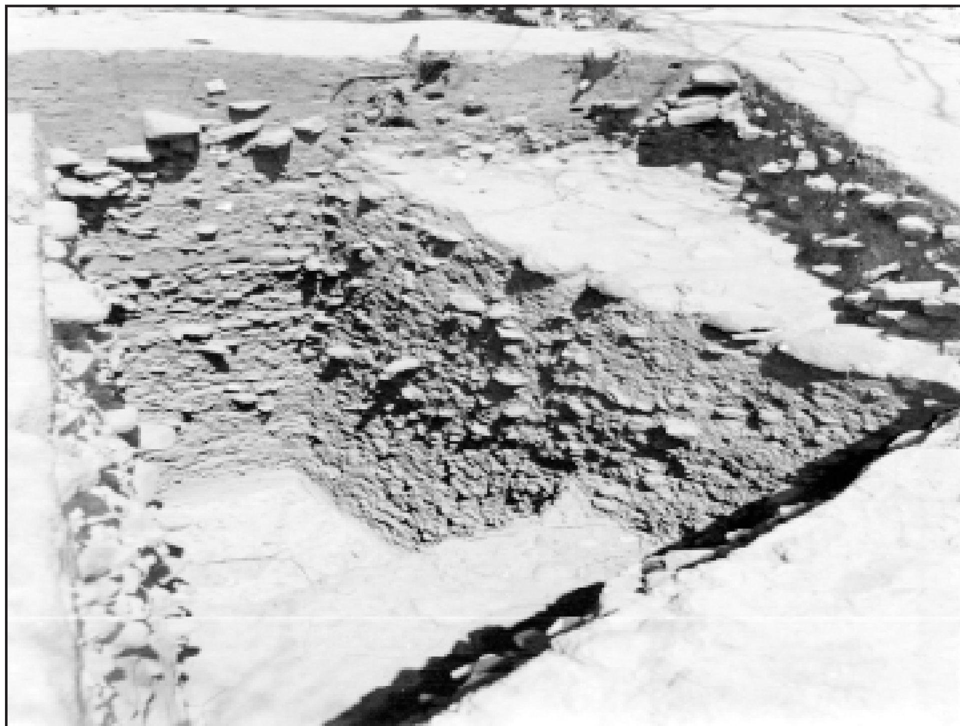


Fig. 6. Metamorphic rock and quartzite pebbles in the oldest terrace at Adi Badri.

occurring in Siwaliks only like sandstones, shale, greywacke, etc. The Siwalik hills do not contain rocks belonging to quartzitic and metamorphic suites. The presence of alien rocks as pebbles in the oldest terrace, point towards a conclusion that another mighty river had once occupied targeted valleys. It is significant to record that younger terraces in these valleys comprise rocks belonging to Siwaliks only and do not contain even a single pebble of quartzite and metamorphic rocks except along the present day Yamuna Valley.

Therefore, terraces at Sudanwala, Bata, Garibnath, Markanda and Adi Badri provide an irrefutable scientific evidence to suggest that a gigantic river was flowing in almost WNW direction in the past. Its dimension was very large as it contained very high discharge and traversed a region where the above-mentioned rocks, viz., metamorphic and quartzite occurs in abundance. Such a region does exist in central and upper reaches of Yamuna Fourth Oder Basin where Central Crystalline and Jutogh Group of rocks are located towards north, north-east and eastern side of the above-mentioned terraces.

VEDIC SARASVATI

Origin of Vedic Sarasvati: Palaeo-glaciation parameters have been utilized in upper reaches of the Tons Valley to develop a model for the identification of the source of Vedic Sarasvati. Moreover, all the scientific evidences discussed earlier in this paper point to only one conclusion that present day the *Tamas* or Tons River was in fact Vedic Sarasvati in its upper reaches that was fed by a large glacier. It was fed by glaciers that had descended to much lower elevations in Garhwal Himalaya than the present day level during Pleistocene Ice Age. Also, parameters suggested by Bahr (1997)[13] and Klemen *et al.* (1997)[14] were used in re-constructing the model for the trunk glacier.

Sarasvati Glacier: A massive trunk glacier occurred at the head of the present day *Tamas* or Tons River and its snout was located at Naitwar situated on its confluence with the present day Rupin River in Har-ki-Doon area of Garhwal Himalaya, Uttaranchal. This trunk glacier has been designated as Sarasvati Glacier. It is striking to record that its present day remnant is Bandarpuch (monkey tail) glacier. The Sarasvati glacier was 58.8 km in length that possessed an average width of 3.5 km occupying an area of 205.8 sq. km. The general orientation of the trunk glacier is towards south-west but its ablation zone had acquired a crescent shape. The Sarasvati glacier was fed by three northern bank tributary glaciers. Adjoining its snout front, Rupin glacier system that flowed in almost southerly direction contributed its supply. Further north-east along the Sarasvati glacier, the second tributary glacier was Supin glacier system that directly joined the trunk glacier. Near the accumulation zone of the trunk glacier, yet another glacier system, viz., Jamadar-Morinda joined it. There were other smaller tributary glaciers that flowed in northeasterly direction from the southern divide and joined the trunk glacier. From Sarasvati snout front, Vedic Sarasvati originated as an open wall melt water channel that gradually developed into a major river system analogous to present day Bhagirathi River that originates from Gangotri glacier in almost similar conditions (Puri and Shukla, *op. cit.*)[15]

Course of Vedic Sarasvati in Himalaya: After originating from Sarasvati snout front at Naitwar, Vedic Sarasvati started flowing in southwesterly direction for nearly 40 km and it acquired very large dimensions and a very high discharge. From Pabbar (yet another glacier-fed river at that time) confluence, it took a southerly course and flowed in a tortuous manner for nearly 100 km before entering Paonta Doon area. Here, the Aglar, Yamuna and Giri joined the Vedic Sarasvati. In other words, Vedic Sarasvati followed the course of present day Tons River in initial stages but a remarkable change

is perceived in Paonta Doon. From here, it acquired a course that is aligned along south of Kalsi, Garibnath, Paonta and Bata valleys, i.e., west to southwesterly direction and flowed over the raised platform of Siwaliks. Subsequently, in Bata Valley, Vedic Sarasvati took a southwesterly swing and entered the plains through Adi Badri (Fig. 7).

As mentioned earlier, the field evidences suggest that area between Garibnath-Kalesar and Markanda valleys has been filled with huge pile of sediments. Thus, the main drainage of Vedic Sarasvati followed this terrain and oscillated between Adi Badri and Markanda valleys. Gradually, it started occupying Markanda Valley due to tectonic activity whereby the Siwalik belt was uplifted. In due course of time, it is quite possible that Vedic Sarasvati was entering the plains from Adi Badri as well as Markanda conduits.

Significantly, SSE conduit across Siwalik belt at Kalesar (which incidentally is now occupied by the Yamuna), was not active at all during the early stages of Vedic Sarasvati evolution. Therefore, 'present day Yamuna River flowing in plains was also not in existence at that time' though it remained confined to a tributary status only in Paonta Doon area.

After entering plains at Adi Badri, Vedic Sarasvati followed southwesterly course and flowed through Kurukshetra. Thereafter, it took a westerly course (= the Ghaggar) and 25 km south of Patiala, it received yet another major nourishment from an old and perennial river – the Satluj which joined it on its right bank. Further down, its course has very systematically been described in the plains of Haryana, Rajasthan and Gujarat by Yash Pal *et. al.* (1980).[16]

Therefore, it was a consequent drainage with many obsequent tributaries like the Pabbar, Aglar, Yamuna, Giri, etc. It transported down huge quantity of sediments from the terrain it traversed (Tons Fifth Order Basin) and deposited in Paonta Doon. During floods, it transported pebbles of metamorphic rocks and quartzite and deposited on its terraces. Hence, terraces found in Sudanwala, Bata, Garibnath, Adi Badri and Markanda valleys are remnants of degradation terraces of Vedic Sarasvati.

CAUSES FOR DISAPPEARANCE OF VEDIC SARASVATI

Vedic Sarasvati is the only river amongst the ancient rivers of northern India that has completely disappeared now. Its disappearance has always been a matter of great speculation all over. However, it was caused by past climatological variations and tectonic activity in its catchment area at the conjunction of two great river systems or First Order Basins of northern India. It is striking to record that the targeted terrain lies almost parallel to the Aravalli axis which is the oldest zone of weakness.

The process of disappearance of Vedic Sarasvati has been studied in great depth and a model has also been developed. The sequence of its disappearance is enumerated below:

A. YAMUNA TEAR FAULT AND DRISHADVATI RIVER

Agarwal *et. al.* (1961)[17] found that south of Paonta, northwesterly extension of Mohand structure, is terminated by a vertical Yamuna cross fault which runs almost parallel to present day Yamuna River. Yamuna tear fault is a plane of structural discordance and a fundamental fracture that exists in almost north-south disposition at Kalesar and extends across the Siwalik belt. Moreover, this fault has displaced even the Siwalik belt. This tear fault has been reactivated from time to time in geological past and its reactivation is accompanied by high seismic activity. The last major seismic activity was recorded as Kangra earthquake (1905) since its secondary epicenter was located in Yamuna tear (Shome and Mandwal, 1979).[18] This geological structure is active even today. This feature remained dormant, rather inactive, during early phases of Vedic Sarasvati evolution. That is why this majestic river took a westerly and southwesterly course in Paonta Doon area and entered the plains at Adi Badri. As a result of Yamuna tear reactivation, two events took place in the evolution of Vedic Sarasvati.

Concomitant high seismic activity generated due to the above phenomenon was responsible for destruction of many pre-Harappan cities. Paul (1996, personal communication) intimated that archaeologists discovered remains of a pre-Harappan city beneath Harappan citadel at Kalibangan that was destroyed by an earthquake. Radiocarbon dating demonstrated destruction of this city around 2450±150 BC.

Drishadvati River: A fault plane is plane of great weakness. This plane of weakness will enable any denudation agency, particularly a river, to carve a course through a thick pile of sediments at a faster rate. Thus, opening up of a conduit as a result of the above-mentioned phenomenon is a corollary to any fault plane reactivation.

Vedic Sarasvati started eroding the enormous pile of sediments in Paonta Doon area as a consequence of Yamuna tear reactivation. Furthermore, seismic activity that accompanied this phenomenon also supplemented the efforts of Vedic Sarasvati in this direction by loosening thick pile of sediments. With further uplift of catchment area of Yamuna Fourth Order Basin in Himalaya (a process which is still continuing today) and prevalence of humid or wet phase of climate, excessive melting of glaciers caused extensive and heavy water discharge in Vedic Sarasvati. Consequently, in due course of time, a major portion of Vedic Sarasvati River in Paonta Doon area carved a conduit along this fault plane across

the Siwalik belt and it started following this new course across the Siwalik belt into present day Haryana plains at Kalesar. Yash Pal *et. al.* (*op. cit*)[19] marked this new channel as Drishadvati River. It followed Y2 channel marked on his map and flowed through Hissar, Bhadra Nohar, etc. and joined Vedic Sarasvati on its left bank near Suratgarh in Rajasthan. However, Drishadvati River continued to nourish Vedic Sarasvati as its tributary river during its course in Rajasthan and Gujarat. It is pertinent to add that a major portion of Vedic Sarasvati continued to follow Adi Badri and Markanda courses at this stage. Vedic Sarasvati was flowing in the plains over a westward tilted block. That is why Drishadvati River joined it as its tributary in Rajasthan.

B. BATA-MARKANDA DIVIDE AND CONSTRICTED VEDIC SARASVATI CATCHMENT

Another development took place that could be regarded as the beginning of disappearance of Vedic Sarasvati. Neo-tectonic activity developed a orographic feature which is termed as Bata -Markanda divide. This activity uplifted this zone by nearly 30 m (100 ft). The resultant effect consequent to changes in slope direction was a complete reversal of slope whereby the entire Bata drainage flowing in westward direction was captured towards the southeast. Consequently, the main drainage of Vedic Sarasvati also suffered the same setback and now started flowing through the Drishadvati outlet whereby its original course through Bata Valley and Adi Badri-Markanda was abandoned. Thus, the Drishadvati River captured the entire perennial nourishment emanating from ablation of Sarasvati glacier in Yamuna Fourth Order Basin. Hence, the permanent source of supply from Himalaya to Vedic Sarasvati was now confined to Drishadvati River only. At this stage, the catchment area of Vedic Sarasvati in Himalaya got sizably reduced to a non-perennial catchment of present day Markanda due to the emergence of the above referred Bata-Markanda divide.

Now, Vedic Sarasvati started flowing through Drishadvati conduit. This reduction of catchment area has been computed to be 94.05% of the original area. The above catchment now restricted, received its nourishment only from liquid precipitation of monsoon only. Consequently, the upper portion of Vedic Sarasvati in plains up to Satluj confluence started getting seasonal discharge only.

C. SHIFT IN COURSE OF SATLUJ RIVER

Shifting in the course of *Shatudri* or the Satluj River is one of the most important developments that caused the disappearance of Vedic Sarasvati. In earlier stages, the Satluj River entered the plains from Himalaya at Ropar

or Roopnagar in Punjab and flowed in S 10° E direction and joined Vedic Sarasvati 25 km south of Patiala. The present course of the Satluj from Ropar westwards is a very recent phenomenon. Braided palaeo-channels of the Satluj lying between the present day Satluj and Vedic Sarasvati were depicted in a map utilizing remotely sensed data published by Yash Pal *et al.* (*op. cit.*)[20] (Fig. 8). The present day Ghaggar has also been demarcated and its ancient bed has an average width of about 6 to 8 km from Shatrana to Marot. The braided channels constitute the signature of the Satluj as it migrated westwards to join the Indus, abandoning Vedic Sarasvati. This migration was caused by neo-tectonic activity and as a result of which the course of the Satluj River started shifting westwards and got completely detached from Vedic Sarasvati.

Since this process is still continuing and the Satluj takes almost 90° turn from Ropar and flowing westward, it acquires southwesterly course at Hari-ka-Pattan (Beas confluence) and joins the Indus in Pakistan. It is recorded that the Beas River used to join the Satluj at Bhao-ka-Pattan (between Kasur and Ferozpur) as late as twelfth century AD. This confluence shifted to the present one (Hari-ka-Pattan) in sixteenth century AD. Moreover, in the last 100 years, the Satluj has shifted its course westwards by almost 16 km from Budha *nala* near Ludhiana to its present one.

Archaeological inputs come to the rescue for dating this important event of Satluj migration. Numerous Harappan sites were destroyed neither by natural calamities like floods, earthquake, etc. nor by man induced acts like war but inhabitants of those towns were forced to emigrate to other suitable areas. Raikes (1968)[21] found that Kalibangan city was abandoned due to drying up of the river since it was situated on the banks of Vedic Sarasvati. This event has been dated 1800$\pm$100 BCE (Radiocarbon dating).

It is quite likely that migration of this river course might have started around 1800 BCE – a process which is still continuing even today. The resultant effect of this migration was complete switching off of the perennial nourishment to Vedic Sarasvati on its right bank. This process further strengthened the process that was drying this major river.

D. TILTING OF BLOCK AND MIGRATION OF DRISHADVATI RIVER

Hitherto, the block on which Vedic Sarasvati had been flowing remained tilted towards the western portion of the sub-continent. Due to tectonic activities in operation, this block got tilted towards the east. This process started after Drishadvati River had come into existence. The resultant impact of this process was initiation of migration of Drishadvati towards the south-

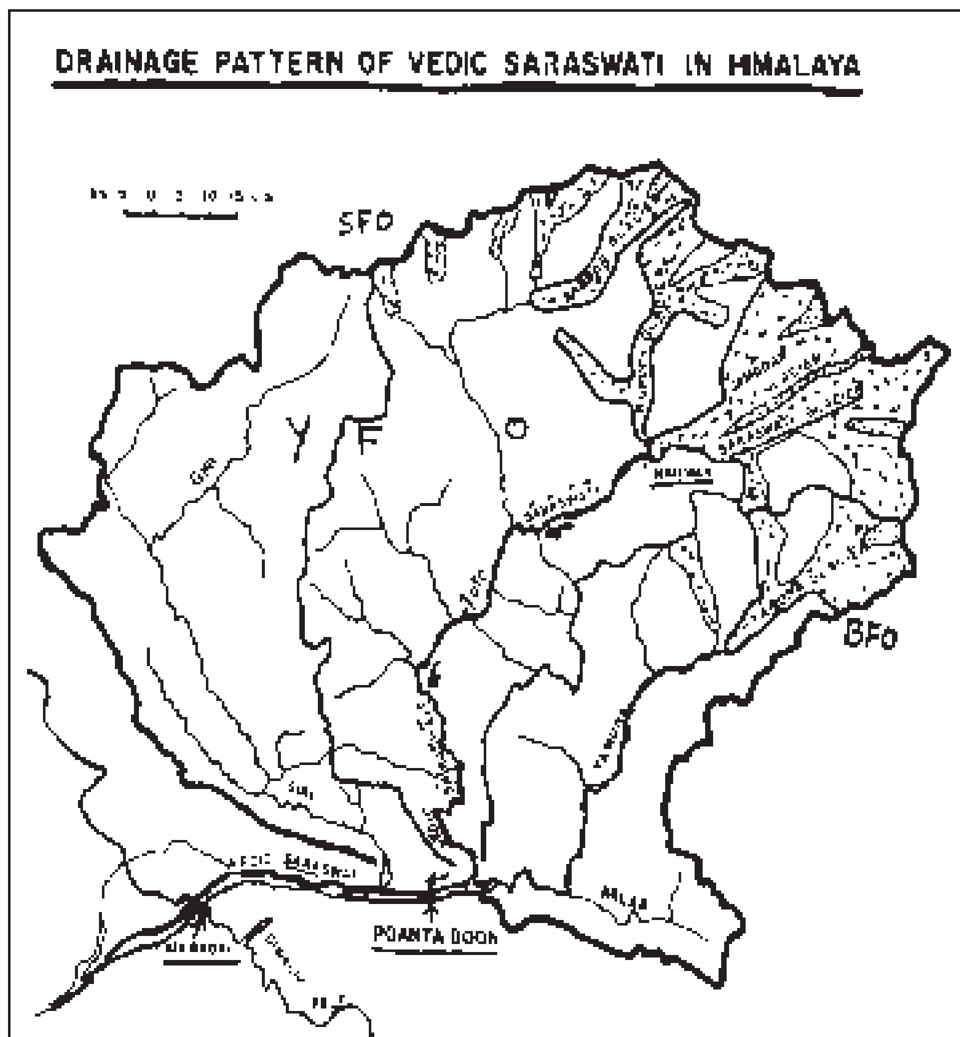


Fig. 7. Course of Vedic Sarasvati in Himalaya.

east. Yash Pal *et. al.* (*op. cit.*)[22] identified it to Y3 channel and termed it Palaeo Yamuna. Thus, Palaeo Yamuna (erstwhile Drishadvati River) started flowing as an independent river and joined the Chambal River in the southeast through Bharatpur. At this stage, Drishadvati River ceased to exist and got converted into an independent river system and consequently got completely detached from Vedic Sarasvati. Hence, Vedic Sarasvati suffered a severe setback and acquired the status of a seasonal river.

Fig. 8. Present Rivers and the Palocochannels of the Satluj and the Yamuna joining the old bed of the Sarasvati

E. SEASONAL VEDIC SARASVATI RIVER

The cumulative impact of the above referred events forced Vedic Sarasvati to change drastically from the grandeur of a mighty and a very large river

system to a mere seasonal stream that depended for its nourishment on monsoon precipitation. Consequently, it got converted into a 'temperamental' river that was capable of causing occasional havoc by inducing floods during the rainy season. However, it remained almost dry during the remaining part of year due to complete disruption of nourishment from a perennial source of Himalaya. With advent of drought conditions caused by either emergence of dry phase in climate or failure of monsoon for a number of years rather decades, Vedic Sarasvati got completely disoriented and acquired the status of present day oblivion.

SETTLEMENT PATTERN

It is striking to record that no major settlement sites have been discovered west of Ropar on the Satluj. Nearly 90^{o} swing in the present day Satluj course west of Ropar, is the result of westward migration of the Satluj from Vedic Sarasvati confluence caused by neo-tectonic activity. The Satellite imagery data have established that the Satluj was anchorage loci of Vedic Sarasvati joining the latter at Shatrana where the width of the palaeo-channel is almost 20 km. There are a number of ancient settlements on north-south trending palaeo-channels (Naiwals) of the Satluj course towards Vedic Sarasvati in contrast to their absence west of Ropar. V.N. Misra, (1994)[23] states only two sites each of Early and Mature Harappan period are found on the Satluj near Ropar. Of the Late Harappan period, only seven sites are found on this river, all of them in the upper reaches close to the hills. There is complete absence of the sites once the river enters the plains. Similarly, on the Yamuna, Harappan sites of all period are conspicuous by their total absence whereas they are present in strength in the non-riverine region to the west of Yamuna and those of Mature and Late Harappan, particularly the latter, are present in large numbers on small tributary streams between the Yamuna and the Ganges. It will be clear from the above account that the focus of the Harappan civilization was not on the Indus and its tributaries but on Ghaggar-Hakra (= Vedic Sarasvati) and its tributaries which flowed between the Indus and Ganges rivers.

Nearly 80% of the known sites in India and Pakistan are located on the vast plain between the Indus and the Ganges, comprising the Cholistan region in Punjab (Pakistan), Rajasthan, Haryana, Punjab and western Uttar Pradesh. They range in time from Hakra Ware Culture of fourth-third millennia BC to Late Harappan culture (including its variant, Ochre Coloured Pottery (OCP) of the late second millennium BC). Two of the large settlements of Harappan civilization – Ganweriwala Ther in Bahawalpur and Rakhigarhi

in Haryana – are located in this region. The oldest protohistoric sites, viz., those of early Harappan Hakra Ware culture, are confined to Cholistan region but some of their ceramic elements are known to extend into the adjoining Ganganagar district of Rajasthan. The total absence of Harappan sites and abundance of PGW sites on the Yamuna is eloquent proof that this river was not flowing in the present channel during Harappan times but had shifted during PGW times.

The number of sites of Early Harappan culture on the Indus River is very small – Balakot, Amri, Kot Diji and Mohenjo-daro in Sind; Jalalpur, Harappa, Gumla, Sarai Khola in Punjab. Juxtaposed to this distribution, the number of sites along the dry bed of Hakra-Ghaggar (Vedic Sarasvati) is very dense. During 1981, 41 sites were identified on the Hakra in Cholistan desert and over 60 sites were marked on Vedic Sarasvati (= Ghaggar) in Punjab, Haryana and Rajasthan. Hence, the early settlements were dominantly on Vedic Sarasvati basin. The Ganeshwar metal cultures were also perhaps contemporary to this early Harappan phase. The total number of settlements increases significantly in the Mature Harappan culture phase: 166 sites in Hakra, 18 sites in Gujarat, 16 sites in Indus Valley, 24 sites in Haryana and 34 sites in Punjab. The scenario changes during the Late Harappan phase wherein 72 sites in Hakra Valley, 95 sites in Gujarat, 30 sites in Haryana, 85 sites in Punjab and suddenly 66 sites emerge in the Yamuna-Ganga region whereas not even a single site of Mature Harappan phase existed in this region.

No Harappan archaeological sites are located in the arid region of Rajasthan, near the salt water lakes. However, most of the sites are clustered around river banks. Archaeological evidence of the settlement sites on the banks of Vedic Sarasvati indicates the possibility of migrations away from the banks of the river between 1900-1500 BCE. It appears to correlate with environmental changes analyzed using lithological data and water levels in different formations in Lunkaransar and Didwana lakes (G. Singh, *et. al.*, 1974).[24]The drying up of Vedic Sarasvati and climatic changes were perhaps major reasons for abandonment of ancient settlements of the civilization which had been nourished by it between 3500-1000 BCE.

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3

Peopling of India: Genetics Markers Speak Out!

Gyaneshwer Chaubey

ABSTRACT

Enormous amount of cultural and biological versatility is present in flora and fauna of Indian subcontinent, establishing its significance to study the diversity and population histories. Our genetic results indicate that the tribal as well as caste populations of Indian subcontinent practising a very high level of endogamy albeit they live in a close proximity and share the ritual customs. The present caste and tribal populations largely have a common stock of maternal as well as paternal Pleistocene heritage. They make a distinct cluster with other continental populations, advocating an *in-situ* demographic expansion just after the first arrival of modern humans from Africa. Genetic data does not support any major influx to subcontinent in recent time and gainsay Aryan-invasion theory. Nonetheless, it support Out-of-India theory. Indigenous origin of caste system is more plausible. Overall, our comprehensive study suggests that the several evolutionary forces (founder effects, gene flow and genetic drift) and factors (geographical, linguistic and cultural barriers) have produced the current phylogeography of present Indian gene pool.

INTRODUCTION

By associating archaeological, linguistic and known historical events (such as the migrations of populations) with the variations in the presence of particular genetic sequences inside populations, researchers are often able to trace the ancestry of a particular group of people and find previously unknown genetic relations between populations. Major demographic events

(population migrations, bottlenecks and expansions) leave imprints, in the form of altered gene frequencies, on the collective human genome. Because these imprints are transmitted to succeeding generations, the modern human genome contains an indelible record of our evolutionary past. The deeper we go into it, the more interesting and informative it becomes. As more genetic loci are examined in populations throughout the world, our evolutionary history should be largely decipherable. These mutations allow the tracing of both paternal (Y chromosome) and maternal (mtDNA) genealogies. Use of several markers of these genomes can establish a relation between different individuals and by using molecular approaches and statistical analyses, one can draw several informative evolutionary trees. These uniparental markers were established as the best tools to infer prehistorical movement of any population(s). Another important question in population genetics is identifying the best predictors of genetic relationships among human populations. Several studies indicate strong correlations between genetic and linguistic relationships among globally distributed human populations. At the subcontinental scale, correlations between genetic variation and linguistic or geographic variation differ substantially.

Human social organization can deeply affect levels of genetic diversity. This fact implies that genetic information can be used to study social structures, which is the basis of ethnogenetics. India is a conglomeration of various ethnicities with 4693 communities, 325 languages, 25 scripts and numerous endogamous groups (K.S. Singh, 1997, 2002). It is a home of several tribal and caste pockets which represent different genetic isolates and thus provides unique wealth to understand human evolution. These autochthonous populations reveal striking diversities in terms of language, marriage practices as well as in their genetic architecture. The social structure of the Indian population is governed by the hierarchical caste system. The most contemporary non-tribal population of India belongs to Hindu religious fold and are arranged in the form of main caste classes, viz., Brahmins, Kshatriya, Vaishya and Shudra. All the caste and tribes follow a strict endogamy (although, the permeability varies at different levels) and inside each and every caste, there are many subclans which are purely exogamous, for example 'gotra' system.

The study of peopling of India is considered as 'centroid' to understand the early human prehistory, because it is proposed as a corridor of migration for Anatomically Modern Human (AMH) from Africa to Australia during late Pleistocene. Since last ten years many genetic studies have given a large contribution to explore the incredible diversity of Indian subcontinent (Bamshad *et al.* 1998, 2001; Kivisild *et al.* 1999, 2003; Cordaux *et al.* 2003,

2004; Metspalu *et al.* 2004; Palanichamy *et al.* 2004; Sahoo *et al.* 2006; Sengupta *et al.* 2006; Sun *et al.* 2006; Chaubey *et al.* 2007, 2008a, b). After the African exodus of humans there was an *in-situ* development of lineages as confirmed by numbers of deep-rooting mtDNA lineages emerging from the basal nodes of both superhaplogroups M and N (including R) (Metspalu *et al.* 2004; Thangaraj *et al.* 2006; Petraglia, 2007). These deep-rooting mtDNA haplogroups are spread over the linguistic and other cultural borders confirming to the general autochthonous diversification of the Indian maternal gene pool and hence, the common Palaeolithic origin for the people that today speak diverse languages and belong to different castes and tribes (Metspalu *et al.* 2004; Palanichamy *et al.* 2004; Sun *et al.* 2006; Thangaraj *et al.* 2006; Chaubey *et al.* 2008b). In recent years the increased resolution of genetic markers revealed new insights about the peopling of India and their dispersal. However, there are several issues such as origin of caste system, segregation of *gotra* and several historical disputes which need to be testified.

ORIGIN OF SOCIAL SYSTEM AND LANGUAGE GROUPS

The reach of modern humans to Indian subcontinent through southern dispersal followed by *in-situ* differentiation led them to put their footsteps in different parts of India. The finding of several Mesolithic sites suggests the favourable climate and a rapid expansion of modern humans all over the subcontinent (Mishra 2001). This process directed towards the settlement of humans in many unoccupied areas and the expansion was supported by wetter climate and abundance of diversity of plants and animals (Petragila and Allchin 2007). The increased food supply helped the hunterer and gatherer societies to stay at a place, resulting in the advent of communal system. Agricultural system helped to amalgamate people in many small groups. One important aspect of the Indian social system, which makes substantial impact on the inferences one can make from the caste/tribal genetic variation, is that the definition of the scheduled caste has not been very clear. Specifically the scheduled tribes are gradually incorporated into the caste system as scheduled castes (Chaubey *et al.* 2007). The social uplifting process enhances gradual absorption of tribal populations in the caste system (for details see Chaubey *et al.* 2007, 2008a). Above processes divided people into several small pockets, initiating the formation of many castes and tribes and later sub-caste and sub-tribes. Consequently, the social behaviour came into existence which has given rise to a new system called endogamy. These clans started practising a marriage restriction within endogamous groups, having several exogamous sub-clans. Such processes created a high level of strict endogamy in Indian populace in which the populations do not

share genes even though they live at the same social level and exchange the rituals and other traditional occupations with one another and maintain their unique identity.

There are four main language families spoken in India. The largest group, Indo-Europeans, are prevalent in northern, central and western India. The second largest, the Dravidian family, covers the majority of the languages in the south. Austro-Asiatic speakers live mainly in east while Tibeto-Burmans reside in the north-eastern region. Most of the Indo-European speakers belong to castes, whereas the majority of the tribal populations speak languages from the other three families. Dravidian-speaking populations also have the same type of caste hierarchy as in Indo-European. Indo-Europeans and Dravidians largely share the same maternal and paternal genepool (Chaubey *et al.* 2008b). Additionally, the language shift phenomenon also shaped the present language phyla of Indian subcontinent (for detailed see Chaubey *et al.* 2008a). Thus, it is not wise to relate the initial Palaeolithic settlers of India on the basis of certain linguistic affiliations because language groups are much younger than deeply rooted genetic lineages. The origin of Austro-Asiatic groups is not very clear yet. There are two rival models about their origin, one suggests their origin in Southeast Asia and further migration to India (Diamond and Bellwood, 2003; Sengupta *et al.* 2006; Sahoo *et al.* 2006), while the other advocates their migration from Africa as a first settler (Basu *et al.* 2003; Kumar *et al.* 2007). Studies on mtDNA diversity have shown that the Austro-Asiatic speakers from South-east Asia and the Indian subcontinent carry mtDNAs of different stocks (Black *et al.* 2006; Chaubey *et al.* 2008a, b). Similarly, the Indian tribes speaking Austro-Asiatic language harbour the same autochthonous mtDNA haplogroup composition as the Indo-European and Dravidic groups of India (Metspalu *et al.* 2004; Chaubey *et al.* 2008a, b). In contrast, the Austro-Asiatic speaking populations of Indian and South-east Asian's Y chromosomes share a common marker, M95, which defines a single branch (O2a) of haplogroup O. Haplogroup O distribution and frequency put forward its origin further East to Indian subcontinent, so it is more likely that O2a originated in Southeast Asia and was brought by Austro-Asiatic speakers to India.

ORIGIN OF CASTE SYSTEM AND INDO-ARYAN INVASION

Although there is a universal concurrence that Indian caste and tribal populations share a common late Pleistocene maternal as well as paternal ancestry in India (Kivisild *et al.* 2003), some studies on the Y-chromosome markers have suggested a recent, substantial invasion from Central or West

Eurasia (Bamshad *et al.* 2001; Cordaux, *et al.* 2004). The tribal and caste populations have been suggested to derive from different stocks (Cordaux 2004). A recent series of papers that claim to have traced the origins of the caste system to male-mediated, Indo-Aryan invasion that pushed indigenous Dravidian-speaking populations southwards, and established Indo-Aryans at the top of the caste hierarchy (Bamshad *et al.* 2001; Quintana-Murci *et al.* 2001; Basu *et al.* 2003; Cordaux *et al.* 2004). This is supported by analyses of maternally-inherited mitochondrial DNA that shows that Indian caste groups, regardless of rank, are more closely related to Asians and most dissimilar from Africans (Bamshad *et al.* 2001). In contrast, the paternally-inherited Y-chromosome tells a different story while lower castes are still more similar to Asians, upper castes are more similar to Europeans. Publication of these papers started a baseless trend in South-Asian population genetics studies. Most of the researches, either they have supporting datasets or not, started adding the Indo-Aryan invasion, assuming it as a universal solid fact (Quintana-Murci *et al.* 2004; Sharma *et al.* 2005; Thanseem *et al.* 2006; Zerjal *et al.* 2007).

The recent high resolution analyses on Y-chromosomal as well as mtDNA data (Figs. 1, 2) consistently suggest mainly a South Asian indigenous origin for Indian caste communities and hence disagree with any major influx, from regions north and west of India, of people associated either with the development of agriculture or the spread of the Indo-Aryan language family (Metspalu *et al.* 2004; Sahoo *et al.* 2006; Sengupta *et al.* 2006; Chaubey *et al.* 2007, 2008 a,b). The maternal Indian haplogroups show an autochthonous origin (Thangaraj *et al.* 2006). All the haplogroups emerge from the basal node and they are deeply rooted (Fig. 1). However, a West Eurasian and East Asian sharing of haplogroups is also observed in the Indian subcontinent (Fig. 2), but most of them share their ancestry to Indian subcontinent well beyond the Last Glacial Maximum. In paternal genepool both Indo-European as well as Dravidian speakers show a high combined frequency of haplogroups C5, L, H, and R2 which are autochthonous to the subcontinent (Sahoo *et al.* 2006; Sengupta *et al.* 2006). The total frequency of these four haplogroups outside of India is marginally low and the dispersion of these haplogroups from India was due to several pre-historical/historial episodes which corroborate out of Indian theory (Fig. 1). Furthermore, haplogroups E, I, G, J*, and R1* have high frequency in the Near East among the Turks and in Central Asians, but they are absent in India (Sahoo *et al.* 2006; Sengupta *et al.* 2006). Similarly, haplogroups C3, D, N, and O are specific to Central and South-east Asia (Fig. 1). Thus, only haplogroups J2 and R1a have interregional frequency patterns, but their associated high

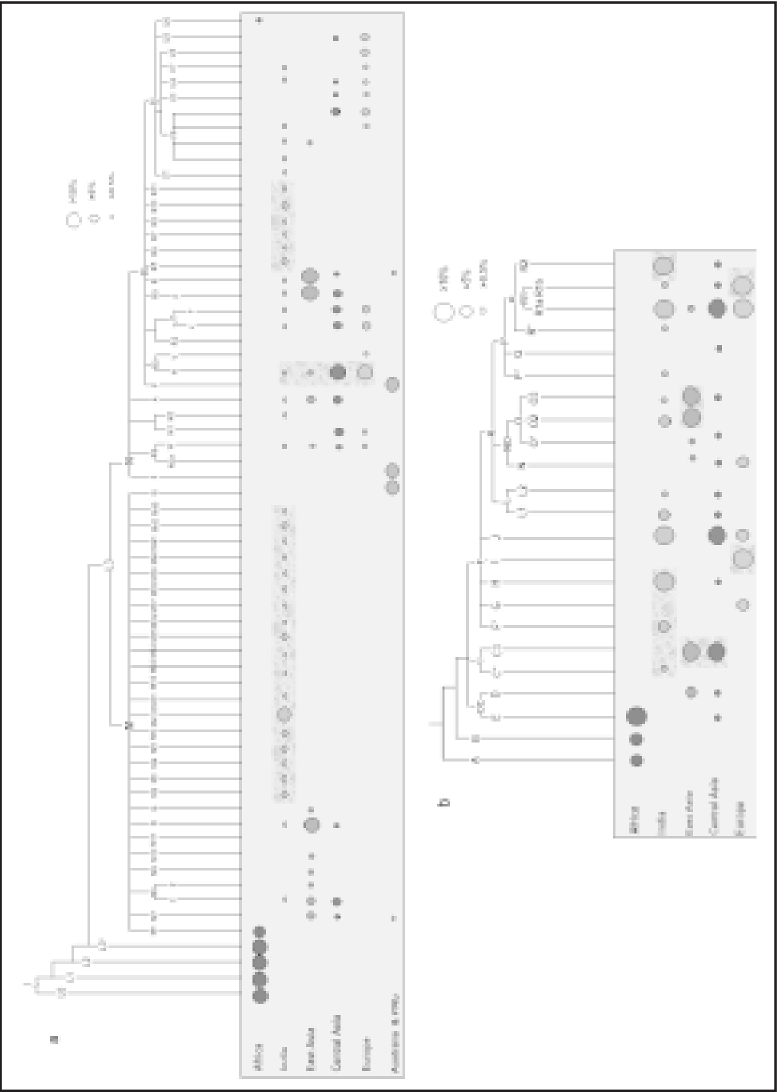


Fig. 1. The global maternal (mtDNA) (panel a) and paternal (Y-chromosome) (panel b), genepool allocation. Based on specific mutations for a precise haplogroup and phylogenetic tree drawn among different continental populations which illustrate their correlations. This tree is adapted from Chaubey *et al.* (2007) and redrawn. The uniqueness of Indian populations is highlighted.

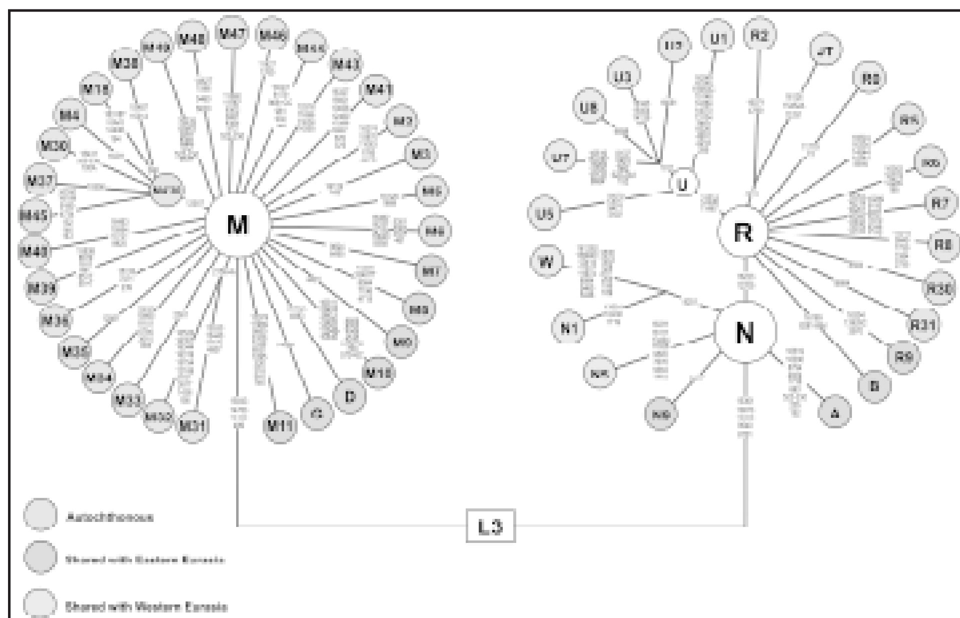


Fig. 2. The deep rooting branching of autochthonous lineages, specific to Indian subcontinent and other lineages shared with West Eurasians and East Asias.

Y-STR diversity and variance attest their ancient split from Europeans and Central Asians, followed by a local expansion. The microsattellite variance and the expansion time of R1a is considerably higher in Western part of India pointing out its origin in Indian subcontinent which would get validation after the discovery of downstream markers. Hence, the current data do not support a model that says a recent genetic input from Central Asia to explain the present genetic variation of India. It also suggests an autochthonous entrenched caste origin which goes back to pre-Vedic period. Based on occupation, the caste system was organized and that was meant to help into development of society by forming the division of labour.

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4

Sarasvati Drainage System of Haryana – Satellite Based Study

A.K. Gupta, B.K. Bhadra and J.R. Sharma

ABSTRACT

Detailed studies of the Sarasvati Nadi of Haryana have been carried out using (multi-date and multi-resolution) Satellite images, GIS techniques and ground data. Palaeo and current channels have been delineated using Remote Sensing techniques and validated using archaeological, litholog, water quality and hydrological data and through catchment area and petrographic analysis of rock samples. Likelihood of Adi Badri as the place of origin of Sarasvati Nadi, and possible linkage of Sarasvati Nadi with the Vedic Sarasvati River and with the Yamuna have been discussed.

1. DRAINAGE SYSTEMS IN HARYANA

The study area forms part of northern Haryana (Fig. 1).

A number of ephemeral drainages such as Ghaggar, Dangri, Markanda, Sarasvati and Chautang presently drain through Haryana. Most of these drainages originate from Siwalik hills and flow to the west through Indo-Gangetic alluvial plain. However, river Yamuna and its tributaries (Somb, Boli and Pathrala) flow in an opposite direction, to the east.

1.1. Sarasvati Nadi

Sarasvati Nadi (known as Sarasvati Nala, Sarasvati River, Sarsuti and Chautang in certain segments) in northern Haryana is one of the important tributary of the 'Lost Vedic Sarasvati River'. Not to confuse with Vedic Sarasvati River, this rivulet has been mentioned in this paper as 'Sarawati

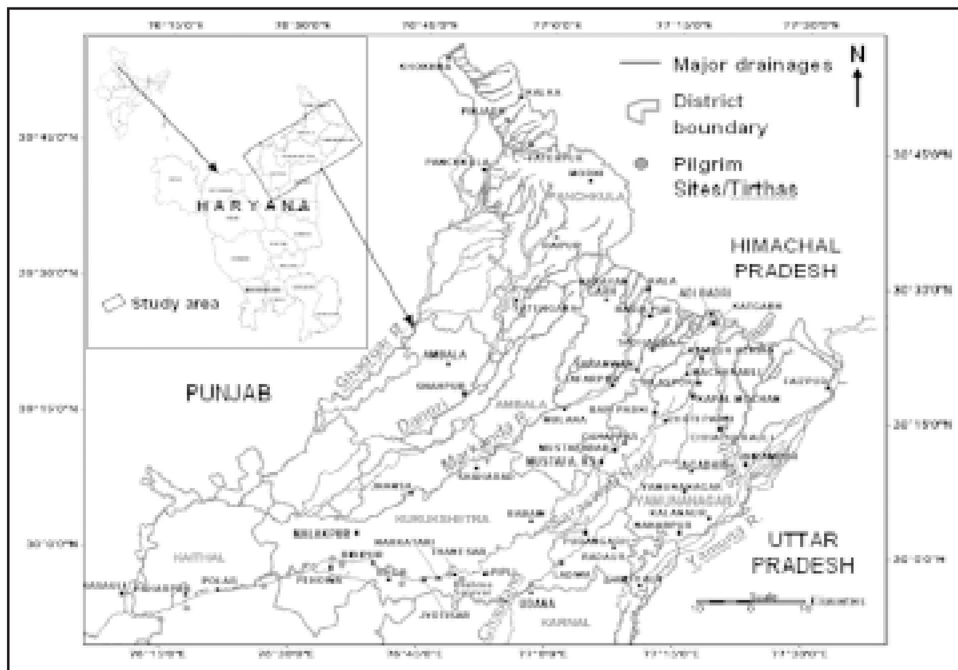


Fig. 1. Spatial distribution of major drainages in northern Haryana. Inset shows the location of the study area. Important pilgrim sites/*tirthas* lie on the bank of Sarasvati Nadi. Inset shows the location of the study area.

Nadi' while the lost mighty Sarasvati of Vedic period (represented today by the Ghaggar) as the 'Vedic Sarasvati river'. Mention of Sarasvati Nadi of Haryana has been made in drainage related studies carried out by various authors in this region like Amal Kar and Bimal Ghose, 1984, Yashpal, 1980 and Valdiya, 2002. The morpho-tectonic control of the drainages of northern Haryana has been discussed by Thussu (1999) and Virdi and Philip (2006). However, exclusive studies on this drainage system are rare. The Sarasvati Nadi originates in the foothills of Siwalik hills near Rampur Herian about 9 km south of Adi Badri in Yamunanagar district and passes through Bilaspur, Mustafabad, Thanesar, Kurukshetra, Kaithal, Bibipur, Pehowa and Fatehabad and ultimately joins river Ghaggar near Rasaula village near Shatrana town of Patiala district, in Punjab (Fig. 1). Presently, Sarasvati Nadi is in defunct state and exhibits as a discontinuous drainage. The existence of Sarasvati Nadi from Rampur Herian to Bibipur and Adi Badri is seen clearly on satellite images. On Survey of India (SOI) topomap of 1969-70, it is shown as Sarasvati Nala/Nadi/River and sometimes as Chautang River. The river passes through Yamunanagar (Bari Pabni, Choti

Pabni, Chhapar, Sadhaura and Mustafabad) and Kurukshetra (Pipli, Thanesar, Jyotisar, Bhor-Saidon, Bibipur and Pehowa). The trace of the Sarasvati Nadi overlaid on the Satellite image is shown in Fig. 2a.

Sarasvati Nadi is believed to be a sacred river. This is evident from the occurrence of several historical temples, pilgrimage and Hindu ritual sites and archaeological relics all along the course of this river; these indicate it to be a perennial river of the past. Most of the pilgrim sites belong to either post-Harappan or Mahabharata period. Drainage pattern of Sarasvati Nadi derived from the SOI topomaps shows two southwesterly flowing sub-parallel streams on either side of the Chautang Nala which criss-cross at several places between Purangarh and Babain villages (Fig. 1). Though Adi Badri is located on the bank of river Somb, the local people strongly believe that Adi Badri where the water oozes from a cave is the place of origin of Sarasvati Nadi.

1.2. Vedic Sarasvati River

The Vedic Sarasvati originated in Himalayas and finally discharged into the Rann of Kachchh in Gujarat coast and disappeared around 3000 BC. It has been a mighty river of north-west India during 6000-4000 BC (Radhakrishnan, 1999). The Vedic Sarasvati River has been flowing sub-parallel to the Indus River in North-West India (Krishnan, 1953). Several remnants of this river exist as palaeochannels (Gupta, 1996; Valdiya, 2002; Yashpal *et. al.*, 1980). Today, the Vedic Sarasvati River is represented by the Ghaggar River which flows on palaeochannel of Vedic Sarasvati, located in the western part of the Haryana state (Bhadra *et. al.*, 2006; Sood and Sahai, 1983). Gupta *et. al.* (2004) have mapped the course of Vedic Sarasvati, buried below sands of Thar Desert, using satellite data and showed presence of Sarasvati channels which are self-evident on Satellite images. They have also validated the course of river through a variety of collateral data.

2. DATA AND METHODS

Multi-temporal Satellite data from IRS P6 Satellites, with different spatial and spectral resolutions, viz., from AWiFS sensor (56 m resolution), LISS-III (23.5 m resolution) and LISS-IV (5.8 m resolution) of February 2004 have been used to delineate the course of palaeochannels and the present drainage systems in Haryana. Digital image processing techniques like histogram equalization, piece/scenewise linear stretching, contrast and brightness enhancement, different band combinations and edge enhancement, etc. have been applied on the Satellite data. IRS P6 LISS-IV data and the Survey of India topomaps (1969) are used to trace present day drainages. GIS database

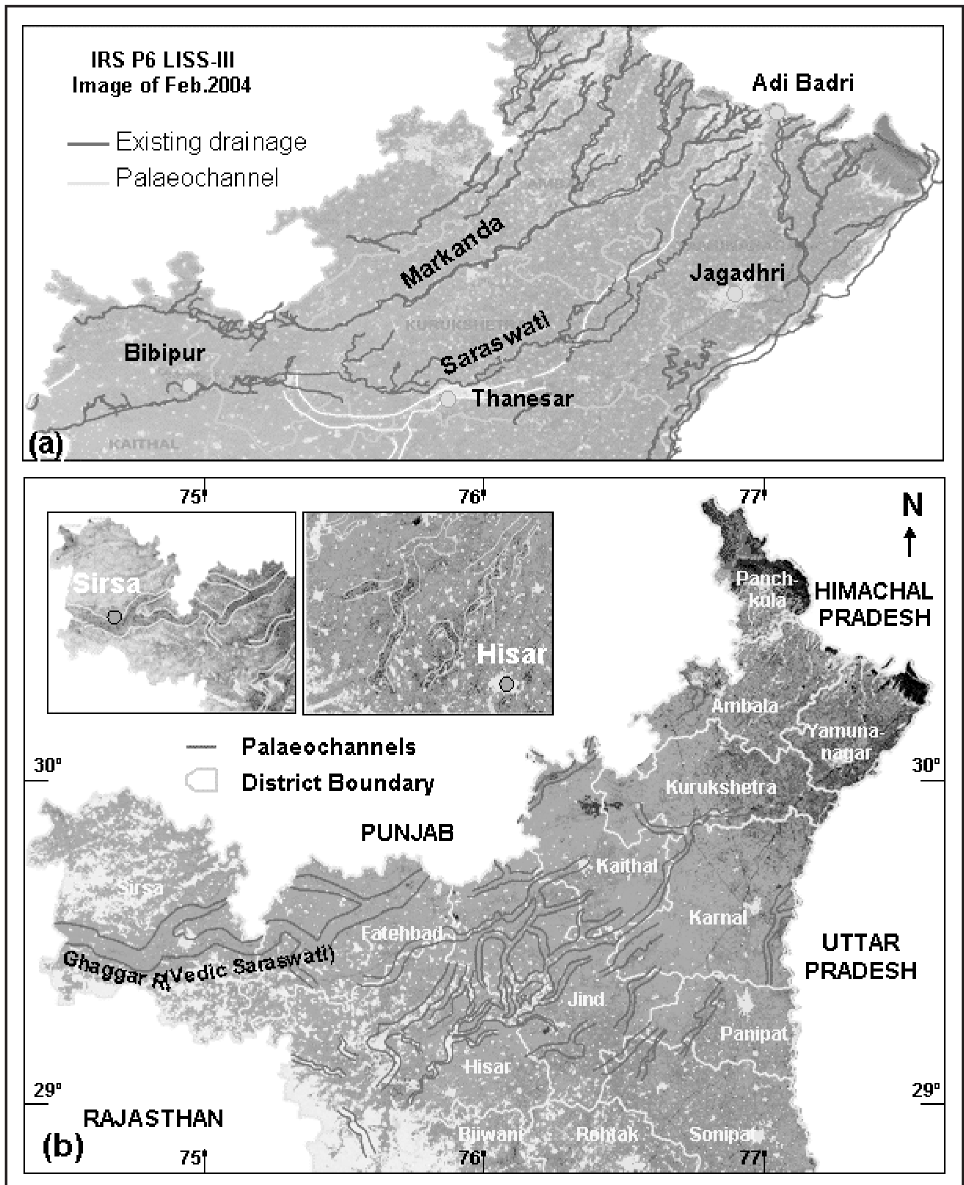


Fig. 2. (a) The trace of the Sarasvati River overlaid on the Satellite image. (b) IRS LISS-III image of Feb. 2004 showing the delineated palaeochannels (blue lines) in northern districts of Haryana. Two inset images show the delineated palaeochannels (zone with dark tone bounded by yellow lines) around Hisar and Sirsa towns.

of various thematic layers, viz., administrative boundary, settlement, road, rail, drainage, watershed area, well location, archaeological sites, etc. have been prepared by using ARC/INFO software for integrated study. Mapped palaeochannels are validated using ground and collateral data/information from archaeology, sedimentology, hydrology, hydrogeology, rainfall and petrographic analysis.

3. STUDIES CONDUCTED

3.1. Remote Sensing Studies

Palaeochannels generally appear on the Satellite image as serpentine drainage course with high moisture content (dark tone). A large number of discontinuous palaeochannels are found in Kurukshetra, Kaithal, Jind, Fatehbad, Hisar and Sirsa districts (Fig. 2b). Study of drainage pattern through Satellite image of February 2004 and the topomaps of 1969 show shifting and narrowing down of Sarasvati Nadi between Pehowa and Adi Badri in the last 35 years.

3.2. Field Observations

Field investigations have been carried out during 2004-2005 along the Sarasvati drainage course, right from Adi Badri-Bibipur Lake-Pehowa to verify the presence of this drainage course. The name of 'Sarasvati Nadi/ Nala' was found inscribed at several old rail/road bridges, which are about 50-100 years old. At many places, sewerage water was observed flowing along the Sarasvati drainage course at Sadhaura and Mustafabad in Yamunanagar district and also in Thaneswar and Pehowa in Kurukshetra district. Suddenly, the drainage becomes narrow (about 10-100 m wide) at several places. Due to climatic and tectonic changes coupled with anthropogenic interventions, the holy river of the past has only the seasonal flow, turned into a sewerage drain obliterated at different places, virtually defunct and witnesses an unbearable pathetic condition.

3.3. Analysis of Catchment Area

Analysis of catchment area has been carried out for Sarasvati, Markanda and Somb drainage systems (Fig. 3). Drainage details provided on SOI topomaps have been used for this purpose. The catchment area of Sarasvati Nadi is confined to Yamunanagar and Kurukshetra disricts. The analysis shows that the watershed area of Markanda River (882.47 sq. km) is larger than the watershed area of Sarasvati Nadi (642.16 sq. km). Since the catchment area of Sarasvati Nadi is confined to the southern slope of the

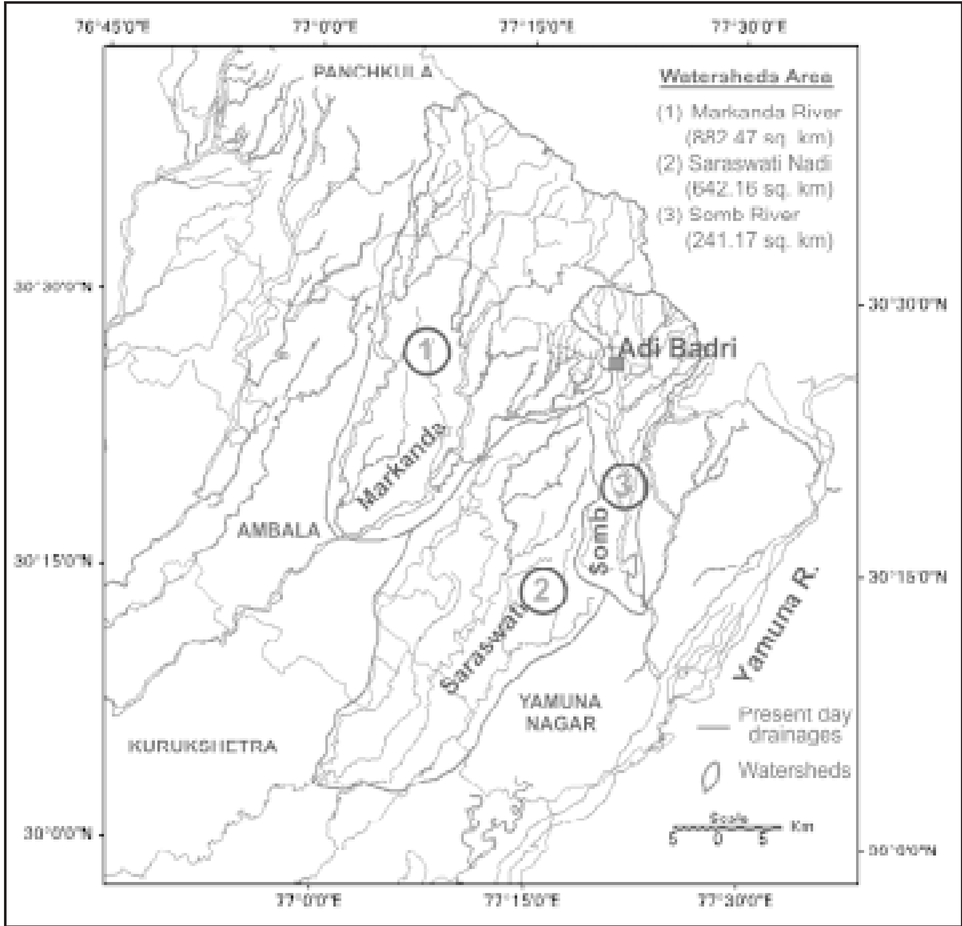


Fig. 3. Drainages and watershed boundaries of (1) Markanda, (2) Sarasvati and (3) Somb rivers on the Siwalik foothills of Haryana.

Siwalik hills, the river receives only seasonal flow. Hence, it is doubted that due to its small catchment and non-Himalayan connections whether this stream (Sarasvati Nadi) could have been a powerful drainage system in the past and served as an important channel of Vedic Sarasvati River.

3.4. Rainfall Analysis

Rainfall data of northern Haryana, collected by Indian Meteorological Department (IMD, Pune) in 1 x 1 grid pattern, has been analyzed for the last 50 years. Data represents the average rainfall of 10 districts of northern Haryana at a location having longitude 76.5 and latitude 29.5 . Rainfall pattern shows an initial increase in rainfall between the years 1951 and

1978 and a gradual decrease from 1978 to 2003. District-wise rainfall data analysis indicates that the average rainfall in Haryana decreases gradually from east to west (Fig. 4a).

Analysis of monthly stream gauge discharge data at Bibipur Kalan across Sarasvati channel shows that Sarasvati and Markanda rivers had been discharging high amount of water flow till 1958 (Fig. 4b). During this

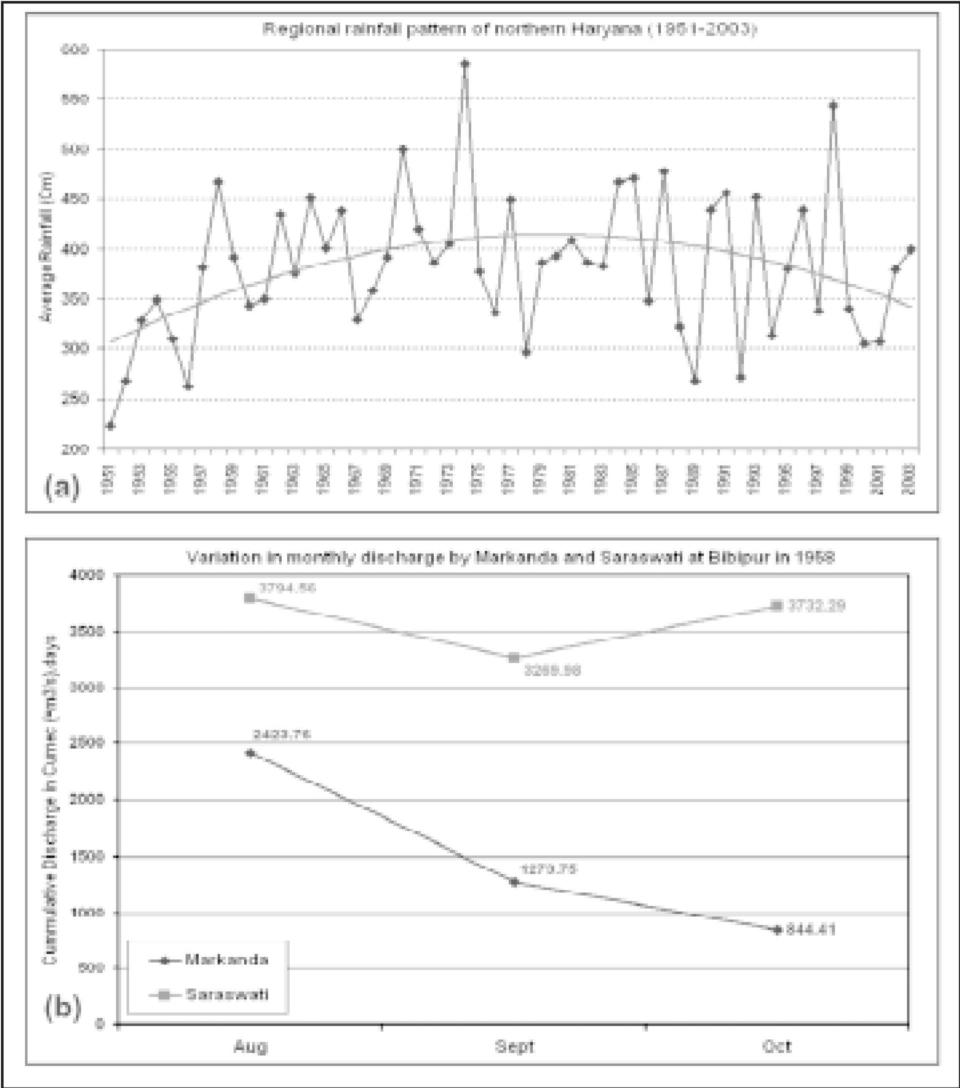


Fig. 4. (a) Regional rainfall pattern of northern Haryana (data at Long. 76.5 and Lat. 29.5) in the last 50 years (Source: IMD, Pune). (b) Monthly discharge pattern of Markanda and Sarasvati rivers at Bibipur in 1958.

period, average discharge from Sarasvati was much higher than the average discharge of Markanda.

3.5. Sedimentological Data Analysis

Litholog and hydrological data from a large number of wells drilled in 9 districts of northern Haryana have been collected from Ground Water Cell, Govt. of Haryana. The locations of the individual lithologs have been plotted in different districts on the map (Fig. 5). On superimposing the litholog points on the palaeochannel map of Haryana, it has been found that most of the lithologs falling near the palaeochennels show medium- to coarse-grained sands with associated gravel and pebbles at a depth between 10 to 100 m. Water quality data of these wells show relatively low EC (2000-4000 µS/cm) indicating good quality water along most of the demarcated palaeochannels.

3.6. Study of Archaeological Data

The locations of archaeological sites, discovered till 2000 in Haryana (Possel, 2000) and a few recently discovered archaeological sites have been plotted

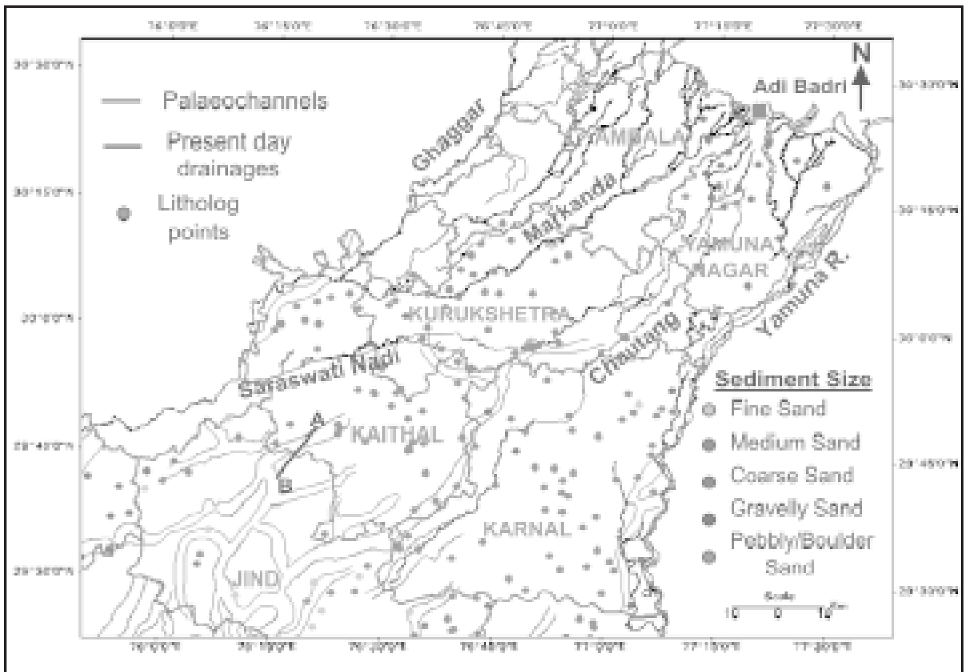


Fig. 5. Size distribution of aquifer sediments (using litholog data) and the palaeochannels in northern Haryana.

on the mapped river courses for age determination. The archaeological sites are classified into four types, viz., Mature Harappan (4600-3900), Sothi Harappan (Mature Harappan-Hakra culture), Late Harappan (3900-3300 mostly post-urban Harappan), and Post to Harappan (3500 BP to Medieval – include OCP, PGW, Prehistoric, Buddhist and Medieval sites) following the classification of Valdiya, 2002 (page 38). Late Harappan sites in northern Haryana have been found mostly in Yamunanagar, Kurukshetra and Kaithal districts (Fig. 6). However, clustered Mature Harappan/Sothi Harappan sites are found to occur in Jind and Karnal districts, where many palaeochannels have been demarcated.

Although the catchment area of Markanda River is larger than that of Sarasvati Nadi, the Sarasvati Nadi shows a much higher concentration of archaeological sites along its course. This indicates towards greater historical significance of Sarasvati Nadi in the region. Recently, an archaeological site (12th century old Painted Grey Ware, i.e., post-Harappan) has been discovered at Bhor Saidan village (Fig. 1), which lies on the bank of Sarasvati Nadi in the west of Kurukshetra (Purohit, 2006). Flourishing of Mature Harappan to post-Harappan culture along the Sarasvati Nadi has been

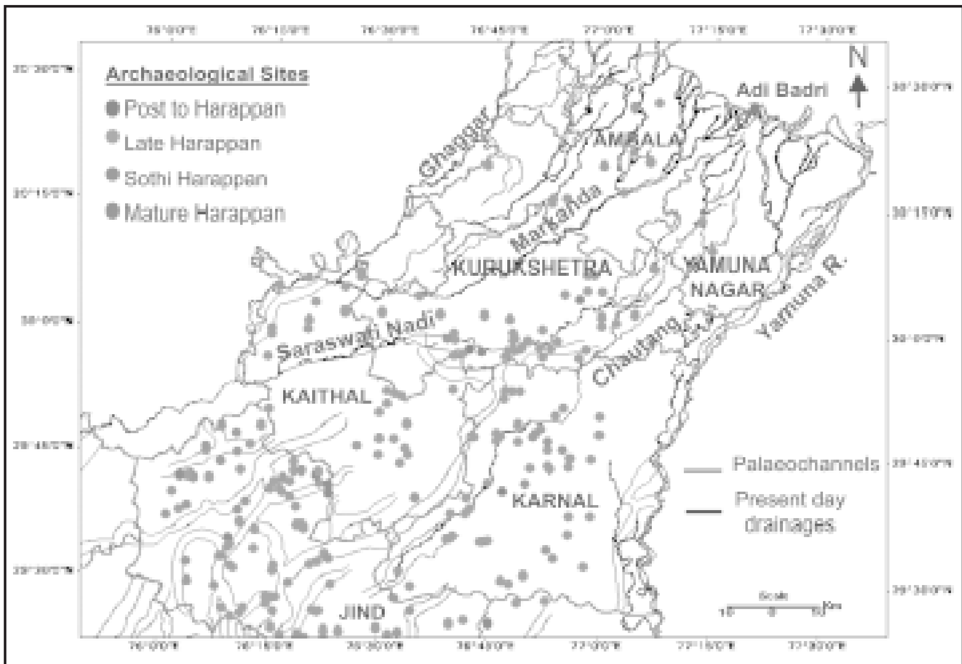


Fig. 6. Spatial distribution of Harappan and post-Harappan Sites in relation to palaeochannels in parts of northern Haryana. Note the concentration of archaeological sites along Sarasvati Nadi.

observed based on above evidences. Archaeological sites of Late-Harappan to Medieval period have been discovered in Adi Badri, Sandhya, Kapal Mochan, Mustafabad, Bilaspur, Sadhaura, Thanesar and Pehowa area which lie mostly along the course of Sarasvati Nadi (Fig. 6).

4. STUDIES SPECIFIC TO ADI BADRI

4.1. Physiography around Adi Badri

Physiographically, Adi Badri lies on an elevated region, on the southern flank of Siwalik hills. Adi Badri area actually lies on the banks of a small rivulet that joins river Somb, which is seen on the high resolution Satellite image (Fig. 7).

Detailed studies have been carried out in and around Adi Badri area to find out its relation with Sarasvati Nadi and also its linkage with other Himalayan rivers such as Yamuna (Tons), Bata and Vedic Sarasvati.

4.2. Adi Badri – Historical Significance

Adi Badri is known as the Haridwar of Haryana due to the existence of three old temples, viz., Adi Badri, Adi Kedar and Mantra Devi. Major archaeological finds have been reported from the Adi Badri area, from excavation carried out by the Archaeological Survey of India (ASI) during 2002-03. From the excavated sites, viz., ABR-I and ABR-II (on western bank of Sarasvati-Somb rivers) confluence and ABR-III (on the eastern bank of the Somb River) (Fig. 7a, b & c), a rich heritage of Buddhist civilization has been reported, right from 3rd-4th century AD to 10th-12th century (Dwivedi *et. al.,* 2005). Stone sculpture associated with *Shivalinga* of Medieval period have been found from ABR-III (Figs. 7d, e & f). A large pond (Sarasvati Sarovar) has been constructed at Adi Badri ABR-I for a holy bath for the pilgrims and a large number of artefacts of Buddhist period have been excavated from this place. Based on the evidences of Hindu ritual sites at Adi Badri stream confluence with Somb River and from the occurrence of several Buddhist settlements and *stupa*, it is concluded that Adi Badri has been an important historic place in the past.

4.3. Riverine Sediment Analysis

The nature of riverine sediments (mostly pebbles) obtained from ABR-I, ABR-II and ABR-III at Adi Badri area (Fig. 7c) has been studied by Puri and Verma (1998). They inferred that these pebbles are of glacial origin and belong to Higher Himalayan metamorphic rocks. The area has been revisited by the present authors in 2005-06 for detailed study of the nature of the

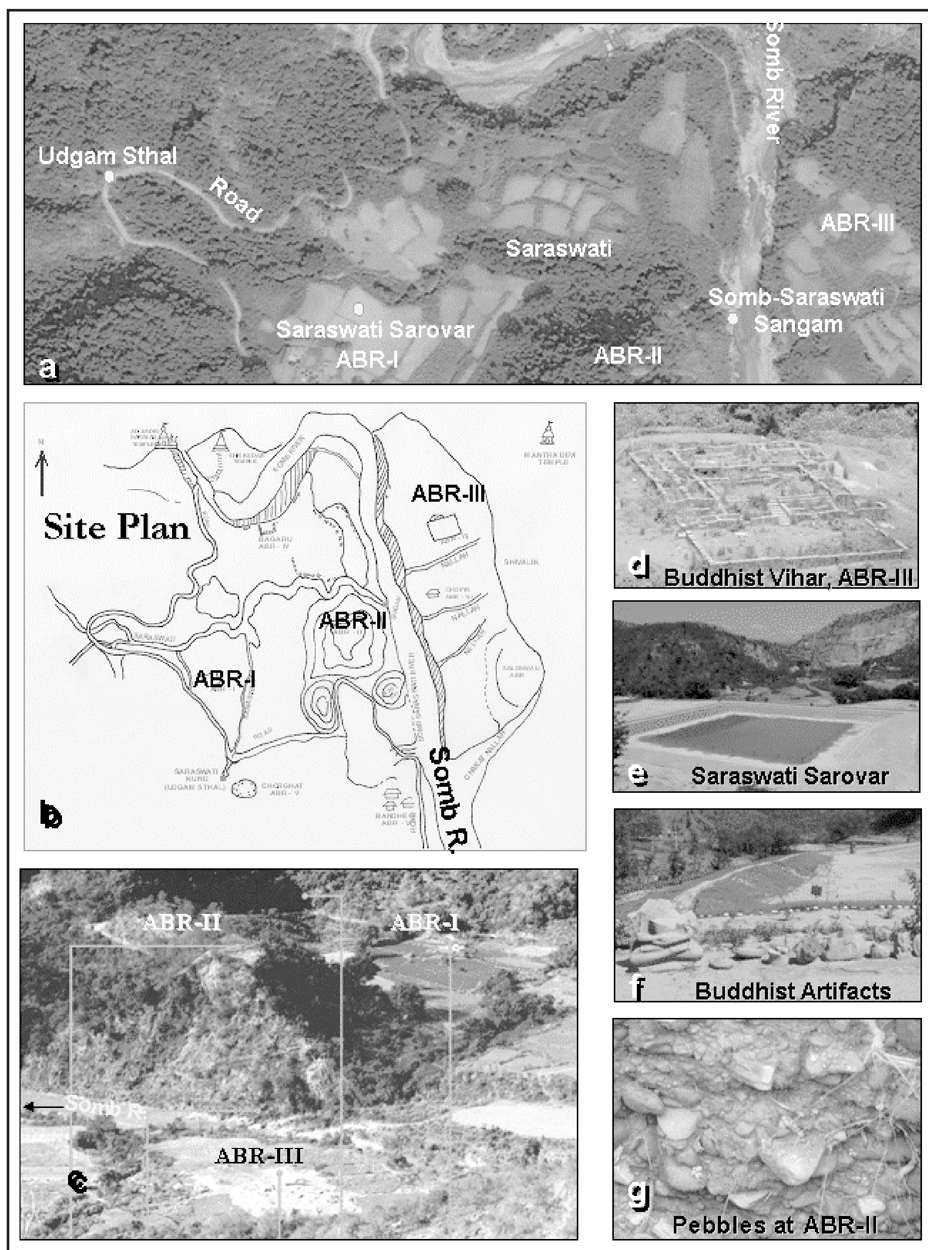


Fig. 7. (a) High resolution Satellite image (Source: Google Earth) around Adi Badri area. (b) Map showing the sites of archaeological excavations (ABR-I, ABR-II and ABR-III) around Adi Badri area (ASI, New Delhi). (c) Photograph-Panoramic view ABR-I, ABR-II and ABR-III. (d) Buddhist Vihar at ABR-III. (e) Sarasvati Sarovar at ABR-I. (f) Artefacts of Buddhist period at ABR-I. (g) Pebbles at Adi Badri-II.

sediments to reveal their source/provenance. Detailed field observation in two pits of ABR-II excavation site shows sub-rounded pebbles which are aligned almost parallel to the valley configuration (Fig. 7g). It reveals that this ridge constitutes the basal part of T3 terrace which was the oldest terrace in outer Himalaya during Holocene period (Puri, 2001; Puri and Verma, 1998).

It is observed that ABR-I and ABR-III are located at a lower elevation on either side of the Somb River. But the ABR-II site is located on a ridge (locally known as Itonwali), 0.5 km north-east of Kathgarh and it lies at a higher elevation (about 70 m high) from the Somb River bed (Fig. 7c). A large number of rounded to sub-rounded pebbles of light to dark grey in colour and medium to coarse grained texture have been found at ABR-II. Moreover, the pebbles are mostly sorted (more or less same size), which indicate the end phase of fluvial deposit. At ABR-II site, pebbles of both sedimentary and metamorphic rocks have been found at ridge top. But pebbles of only sedimentary origin are observed at ABR-I and ABR-III sites. Occurrence of a large number of pebbles at such a higher elevation at ABR-II forming a river terrace indicates that possibly Somb River might have been flowing at 70 m high above the present river bed. In other words, present day physiography is the result of deep river cutting across the Siwalik Hill range.

4.4. Petrographic Study

Thin section study has been carried out for the pebbles, collected from the highest elevation of ABR-II during July 2006. Hand specimens of the pebbles have been examined for their colour, texture and mineral composition. A majority of these pebbles are of sedimentary nature, viz., sandstone, shale, etc. But, a few of them showed anomalous nature and are massive, coarse grained with interlocking grains. Two samples of these pebbles (Fig. 7g) have been analyzed under the microscope. Their analysis is given in the table below:

Petrographic Analysis of Rock Samples at Adi Badri

Sample No. Petrography	**ABS-1**	**ABS-2**
Appearance	Light grey coloured pebbles	Dark coloured, massive pebbles
Texture	Medium grained, sub-rounded detrital quartz embedded within calcareous matrix.	Granulose texture with recrystallised quartz along the veins.

Deformation	No deformation as quartz grains show no undulose extinction.	Quartz grains show undulose extinction.
Mineral Composition	50% Quartz + 40% Calcite + 10% Hbl, Ep, Op	85% Quartz + 15% Micaceous minerals and opaques.
Rock Type	Calcareous sandstone (Sedimentary rock).	Quartzite (High grade metamorphic rock).
Origin	Sedimentary.	Metamorphic.

5. DISCUSSIONS

5.1. Linkage of Sarasvati Nadi with Vedic Sarasvati River

As observed from satellite data and the SOI topomaps, Sarasvati Nadi forms a tributary to the Vedic Sarasvati River (Ghaggar River). Presently, it originates from a place 'Rampur Herian' which is located south of Adi Badri in Yamunanagar district. Since the catchment area of Sarasvati Nadi (642.16 sq. km) is small and confined to the southern slope of the Siwalik hills (Fig. 4) and also as the river receives only seasonal flow and is in defunct stage with thin drainage, the stream in its present form does not qualify to be a powerful drainage system in the past.

However, on the contrary, the sites of Late Harappan to Early Historic period like Sandhaya, Kapal Mochan, Sadhaura, Mustafabad, Bilaspur, Thanesar and Pehowa etc. and also the sites of Mature/Sothi Harappan period, viz., Bhagwanpura, Garhi Rodan and Nandu Khera in Kurukshetra district are found to lie along the course of Sarasvati Nadi and its tributaries (Fig. 6). Further, the relics of a large number of old temples and *ashramas* (hermitages) of Rishis like Parasara, Ved Vyas, Dadhichi, Parsurama, etc., described in ancient texts of *Mahabharata* and *Puranas* and several sacred ponds and sites of Vedic rituals are present along the banks of the obliterated Sarasvati drainage course. All these indicate Sarasvati Nadi to be a historically important and perhaps a perennial stream of the past that served as an important channel of Vedic Sarasvati River. This is also corroborated by the river discharge data analysis available for Bibipur Kalan that indicates Sarasvati Nadi having higher discharge than the Markanda River around the year 1958.

5.2. Linkage of Sarasvati Nadi with Somb River and the Adi Badri

Sarasvati Nadi originates near Rampur Herian village, located about 9 km south of Adi Badri in Siwalik foothills and flows south-westwards from

this point. The Somb River originates further north in the higher reaches of the Siwalik hills. The river is located east of Sarasvati Nadi and flows in north-south direction and finally joins river Yamuna in the south-east (Fig. 8).

Adi Badri is located on the bank of a small rivulet known again as Sarasvati through which most of uphill drainage joins the Somb River (Fig. 7a & b).

Detailed topography of Adi Badri area is studied based on the Satellite data of Shuttle Radar Topographic Mission (SRTM) of February 2000. Close contour pattern (5 m) of this area (Fig. 8a), generated from SRTM DEM, indicate gentle slope between Adi Badri (elevation 360 m) and Rampur Herian (330 m). A height difference of only 20 m has been observed from the tip of Sarasvati drainage line at Rampur Herian (330 m) and the Somb

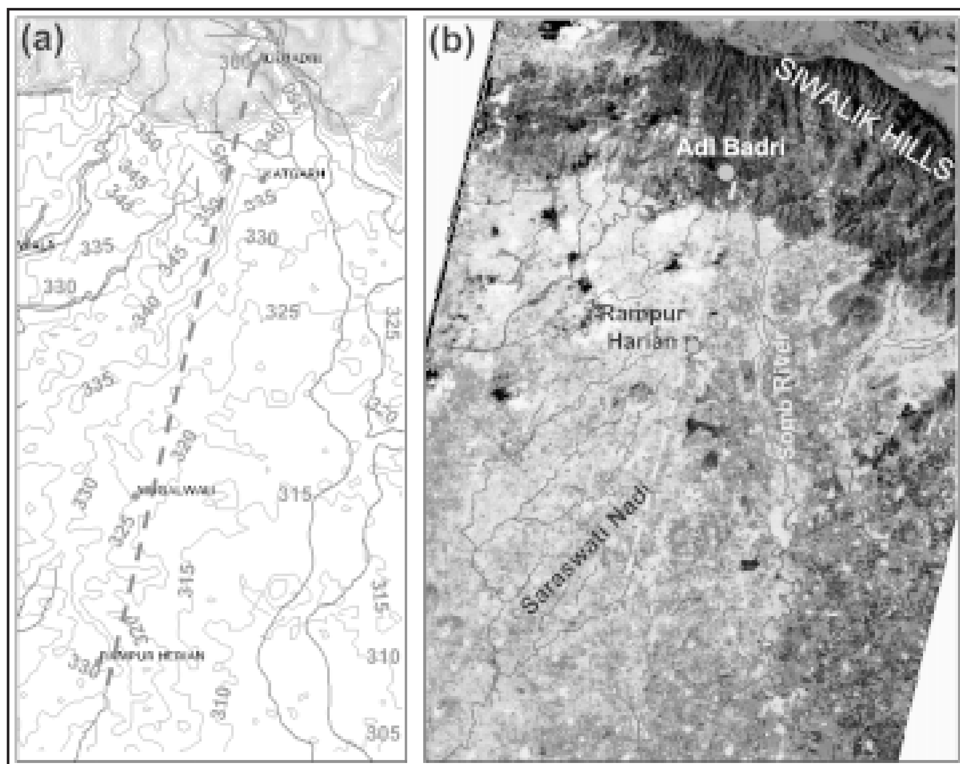


Fig. 8. (a) Elevation contour map (5 m interval) is generated from SRTM DEM (enclosed box only) between Adi Badri and Rampur Herian, west of Somb River. Dash line shows possible linkage of the two places. (b) IRS-P6 LISS-IV Image (5.8 m) of May 2004 showing vegetation anomaly (yellow dash line) from Adi Badri to Rampur Herian, indicating possible link between Somb River and Sarasvati Nadi.

River bed (310 m) in the east-west direction. Thus, the gentle topography and drainage pattern of the area indicate a possibility towards joining of upstream drainage of river Somb with the Sarasvati Nadi at Adi Badri in the past.

On high resolution satellite data (IRS LISS-IV FCC) of May 2004, a strong north-south trending dark greenish red colour linear tonal anomaly can be clearly seen in the south-west of Adi Badri area up to the 1st order drainage from where Sarasvati Nadi originates near Rampur Herian (Fig. 2a and Fig. 8b). This strong image anomaly indicates a possible linkage of upstream Somb River drainages around Adi Badri area with Sarasvati Nadi in the past, instead with river Somb as at the present. The configuration of tributaries of Somb River also indicates towards feasibility of river capture of previously upstream drainage of Sarasvati Nadi by the Somb River at Adi Badri. These evidences leads towards the likely origin of Sarasvati Nadi at Adi Badri sometimes in the past (historic/prehistoric period), as strongly believed even today by the people of the region.

Further, the present level of ABR-II archeological site at Adi Badri is about 70 m above the ground level. Occurrence of rounded riverine pebbles of sedimentary and metamorphic rocks indicate that Somb River might have been flowing relatively at much higher elevation, sometimes in the recent past (post Holocene). In such a case relative height of Rampur herian village, where from the Sarasvati Nadi originate at present, could have been lower than the height of the river bed at Adi Badri. This gives rise to a clear possibility that uphill drainage of Somb river (above Adi Badri) had drained towards Sarasvati Nadi in the past. It is felt that along the north-south trending lineament (linear anomaly) observed on the Satellite data, south of Adi Badri area there has been down warping of the Somb River block, which is now exhibited in form of north-south lineament controlled drainage of Somb River.

5.3. Linkage of Sarasvati Nadi with Yamuna River

Puri and Verma (1998) postulated that the Yamuna (Vedic Sarasvati River) might have drained through the Adi Badri site and dumped the metamorphic pebbles at ABR-II. However, the authors did not discuss how Adi Badri, which today is located along attributary of Somb River (part of Yamuna), formed the part of Sarasvati. Pebbles of metamorphic rock have been found at several places, viz., Adi Badri, Sudanwala, Garibnath, etc. between Tons-Yamuna River confluence (Paonta Sahib) and Bata-Markanda River divide (Fig. 9).



Fig. 9. IRS P6 LISS III image of Feb. 2004 showing Markanda-Bata divide and its misfit wide valley around Paonta Sahib. Movement along the NNW-SSE trending Yamuna Tear Fault was possibly responsible for the diversion of Yamuna towards south.

Puri and Verma (1998) further held that these pebbles might have been transported by a river like Tons which originated from Higher Himalaya in the north. According to the authors, transportation of these pebbles for such a long distance and their deposition on river terraces of Siwalik foothills clearly indicates the existence of an ancient powerful drainage system.

The occurrence of pebbles of calcareous sandstone and quartzite of metamorphic origin at Adi Badri area has also been observed by present authors.

> However, the presence of major water divide/ridge between Bata valley and the southern slopes of Siwaliks, where from Sarasvati-Somb originate do not support hypothesis given by Puri and Verma (1998) about Yamuna joining at Adi Badri through Bata valley.

Hence, no linkage of Sarasvati Nadi with any major perennial river systems like Yamuna could be established based on the available data and evidences.

5.4. Revival of Sarasvati Nadi

Occurrence of a large number of historic and Hindu ritual sites along the obliterated Sarasvati Nadi indicate it to be an important river of the past. The river is in very pathetic condition and at several places sewerage water flows along the river. Therefore, there is an urgent need to safeguard and revive the Sarasvati Nadi which is historically, culturally and archaeologically an important drainage in Haryana. The effort will benefit the people of the region by way of meeting their religious needs like performing rituals along the revived ancient river. This could be done by diverting water (through canals/pipelines) from existing rivers (Markanda or Somb) or from the western Yamuna Canal, which are the sources close to the Sarasvati Nadi.

6. CONCLUSIONS AND SUGGESTIONS

Conclusions drawn from the study are listed below:

Occurrence of the sites of Late Harappan, Mature/Sothi Harappan to Early Historic period and also the relics of a large number of old temples, sacred ponds along the obliterated course of Sarasvati Nadi indicate it to be a historically important and perhaps perennial stream of the past specially during Late Harappan to Early Historic Period.

Findings of artefacts of Buddhists period and *stupas* from excavated sites at ABR-I, II and III and occurrence of Hindu rituals sites at the confluence of Adi Badri stream with the Somb River indicate that Adi Badri has been an important historic and religious place.

Factors such as (a) continuity of drainage lines of Sarasvati Nadi up to the Somb River in SOI topomaps, (b) low topography and little height variations of the area where Adi Badri and Rampur Herian village (the present origin place of Sarasvati Nadi) are located, (c) the configuration of tributaries of Somb River, (d) strong north-south trending image anomaly protruding southward from Adi Badri area to Rampur Herian, indicate towards feasibility of upstream drainage of river Somb having joined with Sarasvati Nadi at Adi Badri in the past. This indirectly indicates towards Adi Badri as the likely origin place of Sarasvati Nadi in the past.

Climatic and tectonic changes coupled with decreased rainfall and anthropogenic interventions along the river course, have been the major cause for desiccation and obliteration of Sarasvati Nadi.

The present day topography, rainfall and drainages of the region does not support the hypothesis of Puri and Verma (1998) that the palaeo Yamuna River (Vedic Sarasvati) after passing through Paonta Sahib and Bata valley, drained from Adi Badri area through the course of present day Sarasvati Nadi.

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5

Ecological Issues in the End of the Indus-Sarasvati Civilization

Michel Danino[1]

ABSTRACT

While some climatic studies of India's north-west indicate that aridity had set in even before the Mature Harappan phase, others point to a higher rainfall, especially in the eastern region, which includes the Sarasvati basin. There is, however, widespread agreement that the Sarasvati declined during the Mature phase and dried up around its end, while in the west the Indus appears to have shifted considerably in its lower course. Ecological factors impacted the Indus-Sarasvati Civilization's agricultural resources and access to fuel wood, but also its river-based communication network. The pressure put on remaining forests by intensive Harappan industrial activities and agricultural requirements may have compounded such developments and hastened the collapse of the civilization's urban order.

THE SETTING

For many years after its discovery in the 1920s, the Indus (or Harappan) Civilization, the first urban development on the Indian subcontinent, was thought to extend no further than the Indus basin, with a few minor sites in Baluchistan. The famous explorer Mark Aurel Stein was the first archaeologist to identify, in 1941, Harappan sites in the then Bahawalpur State, now part of Pakistan's Cholistan desert, along the dry course of the Hakra. Farther upstream, in north Rajasthan (the erstwhile Bikaner State), where the same dry course is known as the Ghaggar, archaeologist A. Ghosh made similar discoveries; that was in 1952, five years after the 1947 partition,

and the findings meant that independent but partitioned India could hope to remain part of the great Indus story.

That hope was amply fulfilled: from the 1960s, further explorations of the region (including India's portion of the Punjab and the Chautang's course in Haryana) by Suraj Bhan, K.N. Dikshit, Jagat Pati Joshi, Katy F. Dalal and R.S. Bisht, among others, brought to light hundreds of sites related to various phases of Harappan culture, the best known of which include Kalibangan, Banawali and Rakhigarhi. From the 1950s, parallel explorations had been taking place in Gujarat by S.R. Rao (who discovered the famous port town of Lothal in 1954), followed by J.P. Joshi (Dholavira in 1966), P.P. Pandya, Gregory Possehl and Kuldeep Bhan, among others. Harappan sites were also identified as far south as the Tapti in Maharashtra.

On the Pakistani side of the Ghaggar-Hakra valley, Mohammad Rafique Mughal followed in Aurel Stein's footsteps and in the 1970s surveyed 363 pre-urban, urban and post-urban sites of the Harappan tradition in Cholistan alone.[2] As a result of all those explorations, the total extent of the civilization is now thought to be almost one million square kilometres, and taking all phases into account, archaeologist Gregory Possehl listed some 2,600 sites a few years ago.[3]

Combining the sites found in the Ghaggar basin with those in Cholistan yields some 640 settlements of the Early phase (3500-2600 BCE) and 360 of the Mature phase (2600-1900 BCE): for the latter, 114 in Haryana, 41 in India's Punjab, 31 in Rajasthan, and 174 in Cholistan (Pakistan).[4] This represents 34% or over a third of all 1,052 sites[5] belonging to the Mature or Urban phase: the region was plainly a major heartland of the Harappan Civilization. But since the middle of the nineteenth century, the Ghaggar-Hakra's wide bed had been identified with the lost Vedic Sarasvati by many Indologists, geographers, geologists, archaeologists and experts in satellite imagery,[6] for the simple reason that the *Ṛgveda* refers to the Sarasvati as a 'mighty river' flowing 'from the mountain to the sea' between the Yamuna and the Sutlej: a flowing Ghaggar-Hakra alone could match such a description. Also, later literature, notably the *Mahabharata*, agrees with the geographical location of the Sarasvati but describes the river as 'disappearing into the sands', which does appear to match its observed desiccation. Finally, a small stream in northern Haryana, which was a tributary of the Ghaggar when it carried water, still bears the name 'Sarsuti', an obvious corruption of 'Sarasvati'. For once, local traditions, literary evidence and archaeology seemed to converge.

If, then, 360 Mature sites were located in the basin of the Sarasvati, should the Harappan Civilization not be renamed 'Indus-Sarasvati

Civilization'? Such was the designation proposed by the late S.P. Gupta in 1989. Although it is imperfect – since it still leaves out most of Gujarat's 310 Mature Harappan sites, another chunk of 30% – it is nevertheless more precise than the limitative '*Indus Civilization*'.

Whatever its name, the evolution of this civilization remains punctuated with riddles, from its birth to its growth and maturity and finally to its decline. The last phase, the most enigmatic, is what concerns us in this paper. Earlier crude theories based on destruction at the hands of invading Aryans having been thankfully abandoned[7] (except in some of our textbooks); the ground has been cleared for more perceptive explanations. They are, broadly speaking, of two types: those emphasizing human agencies and those preferring climatic and ecological factors. Let us add straight away that the two perspectives are not necessarily incompatible.[8]

THEORIES BASED ON HUMAN AGENCY

Two specific traits of Harappan society are the invisibility of a ruler or ruling class and the apparent absence of a military structure, therefore of coercive enforcement. Most archaeologists have attempted to explain the high civic order (evidenced by certain norms in town planning, a unique drainage system, standardization of brick sizes and ratios, seals and writing, weights, etc.) in terms of mechanisms based on trade, culture and religion. Such a peaceful and prosperous civilization – the picture painted so far by the archaeological record – would have been vulnerable to a dwindling trade with Mesopotamia (as seems to have happened around 2000 BCE, judging from Mesopotamian records), to the drifting apart of communities or regions, or even to a simple geographical overstretch.

Earlier views of a centralized 'Harappan empire' with a capital at Mohenjo-daro have fallen out of favour. Jim Shaffer and Diane Lichtenstein propose 'a complex cultural mosaic of related but distinct ethnic groups',[9] while Possehl envisages a few distinct 'domains' centred around five major cities: Mohenjo-daro, Harappa, Ganweriwala (in Cholistan), Rakhigarhi (in Haryana), and Dholavira (in Kachchh).[10] B.B. Lal broadly agrees, but finds in the distinct Harappan regions a parallel with the *Mahajanapadas*, the sixteen 'proto-republics' of early historical times; in this perspective, the Harappan domains would become as many states bound together in a sort of confederacy.[11] J.M. Kenoyer develops a parallel model of city-states,[12] while Dilip K. Chakrabarti proposes a similar picture of 'multiple kingdoms centred around the major settlements of the region'.[13]

In such a perspective, the distinct Harappan regions could understandably be vulnerable to centrifugal forces triggered by changes in

socio-economic conditions. If, for instance, trade with Mesopotamia, the Gulf or the Iranian plateau[14] did come to a halt, important groups of traders, craftsmen, seafarers would have been affected, not to speak of communities involved in procuring the raw materials (semiprecious stones, timber, shell, ivory, etc.) from sometimes great distances. Such a disruption could conceivably have a cascading effect. Or we may picture that with the huge geographical expanse involved, the communication networks broke down at some point for a variety of reasons, such as a weakening of the Harappan social fabric.

Any or all of those explanations are legitimate, but with firm evidence lacking they remain largely speculative. Moreover, because the factors invoked may be consequences rather than causes, it is difficult to decide on an actual chain of events.

DID HARAPPAN URBANISM RISE IN AN ARID PHASE?

Ecological factors stand on somewhat firmer ground, yet they have so far eluded a foolproof synthesis.

Experts have long tried to assess the impact of climate and environment on Harappan life. Among the first major studies, Gurdip Singh's, in 1971, remains a reference. It was based on palynological evidence from three lakes of Rajasthan and envisaged a wet climate during the Mature phase followed by a sharp decline in rainfall around 2000 BCE.[15] In 1984, V.N. Misra refuted Singh's chronology on the basis of archaeological and other evidence, which in his view showed that 'the semi-arid and arid environments' of the region were already established in Harappan times.[16] Moreover, Singh's radiocarbon dates, once recalibrated by Shaffer and Lichtenstein,[17] pushed the wet phase into Early Harappan times, and therefore placed the Mature phase in an already marked trend to aridity.

A decade after Gurdip Singh's study, R.A. Bryson and A.M. Swain also examined pollen from lakes of Rajasthan, and opted for a similar high rainfall model (especially high winter rainfall), with aridity setting in sometime before 1800 BCE.[18] This study, which confirmed Singh's initial interpretation, remains often quoted too, but here also, it was objected (by Madella and Fuller) that after recalibration this phase of higher rainfall should be 're-dated to a pre-Mature Harappan period.'[19]

In other words, if the recalibration exercises are accepted, Singh's and Bryson's work appear to support the view that 'the climate of this region [Greater Indus Valley] was not markedly different in the third millennium BC from the one we have today', as Possehl puts it.[20] Indeed, this is the dominant opinion among archaeologists today, and in support of it, many

studies can be cited besides the above two. Let us list a few as briefly as possible, in chronological order.

1. In 1983, M.B. McKean studied pollen and sediments in the region of Balakot (northwest of Karachi) and concluded, 'There is nothing in the Balakot pollen data, which might suggest that the climate during the protohistoric period in Las Bela was decidedly wetter than at present.'[21]
2. In 1983-85, an Indo-French mission explored an area of Haryana and Rajasthan between the Ghaggar and the Chautang; from a study of sediments in palaeobeds, geologist Marie-Agnès Courty concluded that 'Yamuna-like rivers ... stopped flowing in the study area well before the Protohistoric period', that is to say, well before Harappan times. She also deduced from the study of soils and archaeological deposits that 'climatic conditions have actually fluctuated very little since the Protohistoric period and have therefore remained semi-arid.'[22]
3. In 1995, M.A. Geyh and D. Ploethner[23] carried out an isotopic study in the Hakra's floodplain in Cholistan, where 'between Fort Abbas and Fort Mojgarh, freshwater has been located in a nearly 100 m thick aquifer',[24] with dates ranging from 11000 to 2700 BCE. This suggests that shortly before the Mature phase, the Hakra stopped flowing in this 100 km-long section of its course close to the Indian border.
4. In 1997, S.M. Rao and K.M. Kulkarni conducted isotope studies in water drawn from wells in western Rajasthan along the bed of a 'defunct river' and found no recharge after about 3000 BCE,[25] which agrees fairly well with Geyh's and Ploethner's study.
5. In 1999, Y. Enzel and eight colleagues analyzed sediments of the now mostly dry lake of Lunkaransar and found that it held water in 8000 BCE, began to decline around 4000 BCE and dried up by 3500 BCE.[26]

Those studies do appear to converge, and together lend credence to Misra's and Possehl's views.

OR DID IT THRIVE IN A WETTER PHASE?

But things are not so simple, and another class of studies dashes any hope of a sure-fire climatic formula. Below are some of them:

1. In 1983, R.J. Wasson and six Indian colleagues probed sediments in the Didwana lake of Rajasthan, which still holds some salty water. They found that 'freshwater, high lake level conditions prevailed' between 4000 and 2000 BCE.[27] This precisely includes the Mature Harappan phase.

2. In 1996, P.D. Naidu, studying planktonic foraminifers from the Arabian Sea, found that the upwelling, and therefore the southwest monsoon, was at its lowest from about 1500 BCE to AD 800. The preceding period therefore appears to have had greater monsoon intensity.[28]
3. In 1999, Ulrich von Rad and five colleagues studied varved sediments in the Arabian Sea off Karachi, and concluded that 'precipitation decreased in southern Pakistan after 4000-3500 yr BP',[29] i.e., after 2000 BCE, which agrees with the preceding study.
4. A year later, palynologist Netajirao Phadtare examined pollen and peat in the Garhwal Himalayas (west of the Gangotri glacier) and found evidence of 'a warm, humid climate, with highest monsoon intensity' from about 4000 to 2500 BCE; after 2000 BCE, there was 'a sharp decrease in temperature and rainfall', reaching a minimum about 1500 BCE. Phadtare cited five other independent studies (not part of our list here) from other regions that support 'a decrease in the strength of the south-west monsoon about 4000 cal yr BP', that is, about 2000 BCE.[30]
5. In 2003, M. Staubwasser and three colleagues analyzed planktonic oxygen isotope ratios off the Indus delta. Their findings revealed climate changes during the last 6,000 years, 'with the most prominent change recorded at 4.2 ka BP', that is, 2200 BCE, along with 'a reduction in Indus river discharge'. They observed, 'The 4.2 ka event is coherent with the termination of urban Harappan Civilization in the Indus valley. Thus, drought may have initiated south-eastward habitat tracking within the Harappan cultural domain.'[31]
6. In 2006, Anil K. Gupta and three colleagues synthesized research on the monsoon and other climatic inputs from many sources including their own. 'It appears to us', they concluded, 'that the arid phase in the Indian subcontinent started ca. 5000-4000 cal yrs BP coinciding with a stepwise weakening of the South-West monsoon. ... The arid phase might have intensified ca. 4000-3500 cal yrs BP as has been in the Himalayas, western peninsula and north-western India, and ended ca. 1700 cal yrs BP, when the South-West monsoon was the driest.'[32] Here again, the arid phase starts around 2000 BCE.
7. In 2008, archaeologist Rita Wright and two colleagues used models of archaeoclimatology to plot the intensity of the monsoon and river flow in the region of Harappa. They found that 'around 3500 BC the volume of water in the rivers increases, and the rivers flood', until 'from around 2100 BC the river flow [in the Beas] begins to fall'. Around Harappa, 'a

600-year period of reduced rainfall [sets in] after 2100 BC', leading to 'an unexpected agricultural crisis'.[33] Those two dates roughly bracket the Early and much of the Mature phases.

A CLIMATIC CLIMAX?

I have listed seven studies in each camp, and many more could be quoted on either side.[34] Dealing as they do with different areas of the Indo-Gangetic plains and using different inputs and methods, it is hardly surprising that they should reach widely differing results. This shows, if at all it were necessary, that palaeoclimatology is a complex field. Apart from technical problems with sample selection and processing (especially in the case of pollen) and the possibility of human interference in some of the changes noted (especially as regards vegetation), in 2000 Dorian Q. Fuller and Marco Madella cautioned us against drawing hasty conclusions:

> Changes in vegetation and hydrology, if present at a given lake, should not be generalized into climatic changes for the whole of Rajasthan, let alone the entire Harappan region .... There is growing discomfort with simplistic environmentally determined understanding of change.[35]

Six years later, they repeated much the same warning, acknowledging at the same time the indirect effects of a severe drought from 2200 BCE onward:

> Harappan urbanism emerged on the face of a prolonged trend towards declining rainfall. No climatic event can be blamed for a precipitous end of this civilisation, although strategic local shifts in agriculture that may have begun in response to prolonged droughts at ca. 2200 BC .... A climatic event cannot be blamed simplistically for [Harappan] collapse and de-urbanisation, but Quaternary science data make it clear that we cannot accept a view of climatic and environmental stability since the mid-Holocene in the region (as promoted by Possehl ...).[36]

Very recently (in 2008), Fuller summed up his view of the climate's evolution in the north-west during the period that interests us:

> The mid-Holocene wet period is also characterized by higher winter rainfall in the northwest, which would have affected areas like Punjab, Rajasthan, and perhaps parts of central India .... A drying trend toward modern rainfall conditions had started before the end of the fourth millennium BC and reached levels of near-modern aridity by 2000 BC.[37]

Fuller then lists a series of 'marked events of sudden aridity', with the last one taking place around 2200 BCE. This clearly seeks to strike a middle

path between the two opposite conclusions outlined above: it accepts a general trend towards aridity but stresses peaks of intense drought conditions, therefore implying wetter intervals in between.

The last such peak, at 2200 BCE, also envisaged by Staubwasser *et al.* above, is highly significant, as that dry phase was not limited to northwest India: Anil Gupta *et al.* remind us that 'reduced precipitation has been observed at 4200 cal yrs BP in Egypt and in eastern Turkey',[38] and we know from other sources that around the same time (2200-2100 BCE), a severe and prolonged drought affected Mesopotamia (bringing about the end of the Akkadian empire[39]), large parts of Africa[40] and China,[41] and even North America.[42] If attributing the end of the Indus civilization to this single event would indeed be simplistic, to ignore its impact altogether is certainly unreasonable.

ENVIRONMENTAL ISSUES

Climatic and environmental conditions are two distinct things. Even if we temporarily accept that the Harappan climate was moving towards aridity, it does not follow that the ecosystem was as degraded as it is today.

Early archaeologists such as John Marshall had argued that the depiction of the elephant, the rhinoceros, the water buffalo, etc. on Indus seals pointed to indicate a moister and greener environment; in reply it has been observed that those animals were still to be seen in parts of the Indus valley till recent decades or centuries, and therefore, except for denser gallery forests along the rivers, the environment need not have been markedly different.

Nevertheless, if that were the case, it would be hard to explain the presence in Kalibangan's osteological record of the elephant, the one-horned rhinoceros, the water buffalo, several deer species and the river turtle. For archaeozoologist Bhola Nath, 'the remains of these animals show that the climate at that time was more humid than the arid climate of present day.'[43] To his colleagues S. Banerjee and S. Chakraborty, the occurrence at Kalibangan of the rhinoceros in particular 'strengthens the geological evidence that the desert conditions of this area are of recent origin.'[44] Moving to Gujarat, P.K. Thomas observes that the animal 'is identified from a large number of Harappan and Chalcolithic sites ... [and] inhabited a major part of the Gujarat plains in the protohistoric period .... The identification of large herbivores like rhinoceros, wild buffalo and probably wild cattle at many of the Gujarat Harappan sites suggests that the ecological conditions were more congenial for animal life during the protohistoric period in Gujarat.'[45]

Such observations assume importance in the debate on the environmental degradation as a contributing factor in the end of the urban phase. A few early scholars (including Mortimer Wheeler) had proposed that Harappans may have overexploited natural resources, particularly forests: their considerable brick, pottery and bronze industries would have required a huge and constant supply of fuel wood; intensive agriculture for the consumption of the city dwellers may also have degraded the landscape, as could have overgrazing by the numerous herds reared for the same purpose.

Here again, the theory of 'wearing out of the landscape' was opposed. In 1961, R.L. Raikes and R.H.J. Dyson[46] calculated that '400 acres of gallery forest would have been sufficient for the building of Mohenjo-daro at intervals of about 140 years.'[47] However, let us note that such calculations do not take into account the daily consumption of fuel wood for bronze and pottery industries and for cooking. Also, Walter Fairservis, while endorsing Raikes and Dyson's calculations, added his own concerning the amount of fodder consumed by the cattle used by Mohenjo-daro both as a source of food (dairy products and meat) and for ploughing. His conclusion was that,

> The inhabitants of the mature period at Mohenjodaro would have grown only about one-fourth of their fodder needs. It follows that the remaining three-quarters had to be obtained by foraging in the surrounding forests and grasslands. This formidable assault on the indigenous flora most certainly affected the ecology and had an adverse effect on the land and aided the spread of the active floodplain.[48]

Grazing, and possibly overgrazing, should be added to this picture. Altogether, it appears that archaeologists have of late been too prompt in dismissing the human impact on Harappan ecology. Moreover, in a general trend towards aridity, even small shifts in land use can tip the scales towards desertification (recent illustrations of this principle include the Sahel and inner Mongolia). Whether moist or dry, the Harappan ecosystem was a fragile one, and the clearing of gallery forests for agriculture or industry may have set off a snowballing process. In some regions at least, the Harappans' delicate urban order may have become unsustainable in the face of worsening environmental conditions. Even if this cannot be the sole explanation, encroaching desertification remains, to my mind, one of the likeliest factors contributing to the collapse of that urban order.

DESICCATION OF THE SARASVATI BASIN

An overriding environmental factor remains: the gradual disappearance of the Sarasvati River system, which drained what is today the Yamuna-Sutlej

watershed. I will not go here into the discussions on the Sarasvati's hydrology; suffice it to recall that in 1969, German geographer Herbert Wilhelmy proposed that both the Yamuna and the Sutlej flowed into the Sarasvati until, in stages, they drifted eastward and northward respectively, in effect leaving the Sarasvati depleted.[49] (Possible causes for this desertion include simple erosion and a tectonic uplift in this seismically active region.[50])

Wilhelmy's scenario, with minor variations, has been accepted by most archaeologists, and with good reason: several palaeobeds of the Sutlej and the Yamuna have been identified between the Ghaggar and their present beds; moreover, the drastic changes in the distribution pattern of Harappan sites in the Sarasvati region does lend support to a gradual desiccation of the Sarasvati.[51] The first verdict of archaeology is that the presence of hundreds of Harappan sites in the region, quite a few of them along the course of the Sarasvati and the Drishadvati (today's Chautang or Chitrang, which runs south of the Ghaggar), is proof that it was once well watered. As V.N. Misra put it, 'The large number of protohistoric settlements, dating from ca. 4000 BC to 1500 BC, could have flourished along this river only if it was flowing perennially.'[52]

But the pattern of the sites in the Sarasvati basin over that period yields precious additional information.[53] Settlements of the Early phase (ca. 3500-2600 BCE) reflect a fairly even distribution along the Sarasvati and the Drishadvati. The absence of sites along today's Sutlej and Yamuna is also remarkable, suggesting that neither flowed in their present beds at the time. Three new developments take place during the Mature phase (2600-1900 BCE): 1) the considerable multiplication of sites, except along the Drishadvati, with an extraordinary concentration in lower Cholistan; 2) upper Cholistan (west of today's international border) becomes however devoid of sites, which leads Rafique Mughal to propose that the Sarasvati had begun breaking up early in the Mature phase itself; 3) a confirmation comes from the presence of sites on the Sutlej, which suggests that the river has begun to shift its course westward.

The Late phase sees even more dramatic changes: at the bottom end of the Cholistan, a few sites struggle to survive, while in the east, hundreds of settlements appear to cling to the foothills of the Shivaliks, no doubt dependent on seasonal streams flowing down from the hills. We also note quite a few sites crossing the Yamuna towards the Ganges, pointing to an eastward migration of the Late Harappans. On the other hand, in the central part of the map, not a single Late Harappan site can be spotted: except in its depleted upper course, the Sarasvati has ceased to exist. Altogether, some

1378 Late Harappan settlements have been enumerated in the northern and eastern Sarasvati basin, almost a quadrupling of the number of Mature sites! This reflects the atomization that followed the collapse of urban structure.

The Sarasvati's disappearance could not but have had a huge impact on urban settlements of the region, with a ripple effect elsewhere. As Dilip Chakrabarti puts it:

> To a considerable extent the process [of weakening of the political fabric of the Indus civilization] must have been linked to the hydrographic changes in the Sarasvati-Drishadvati system.[54]

Moreover, by joining the Beas in its westward drift, the Sutlej added its waters to the Indus system, which must have increased the severity of floods in Sind, possibly causing the Indus to shift its course, washing away sites and burying others under its abundant alluvium. H.T. Lambrick indeed proposed that the Indus shifted away from Mohenjo-daro in a process of avulsion: 'The surrounding country, starved of water, immediately began to deteriorate.'[55] Also, the river-based communication that Mohenjo-daro vitally depended on, in Michael Jansen's opinion,[56] would have been seriously disrupted.

A LESSON TO BE LEARNED?

Natural calamities such as a prolonged drought from 2200 BCE, the depletion of the Sarasvati or a shift in the course of the Indus, appear to have combined with man-induced environmental degradation to play a major role in the disintegration of the Harappan urban order. This does not, of course, rule out the human agencies outlined earlier. We may, for instance, picture a situation where the drying up of the Sarasvati coupled with overuse of natural resources made agriculture unviable in the central region (where important sites like Kalibangan, Banawali or Bhirrana were located) and allowed the desert to advance. Economic conditions would have been strained as a result, telling on the social order. Moreover, communication between the Sarasvati and the Indus regions, and between them and Gujarat, might have simply broken down, a process reflected in the term of 'Localization Era' proposed a few decades ago by archaeologist Jim Shaffer for the Late Harappan phase.

Future excavations will certainly refine our understanding of the precise chain of events, but they are unlikely, in my opinion, to lessen the share of environmental factors.

In India, the loss of the Sarasvati may find an echo in the predicted disappearance of the Himalayan glaciers and therefore of the Ganges and

the Brahmaputra.[57] But while the former was a natural cataclysm (possibly compounded by human overexploitation of natural resources), the latter will be largely man-made and may mean the end of the 3,000-year-old Ganges civilization in its mother-region. The scattered Late Harappans were able to adapt themselves to the new situation, fall back on rural settlements or create new ones, relocate themselves when necessary and continue their existence, although in a non-urban context; but how will the tens of millions dependent on the Ganges system survive when Prayag's *triveni sangam* consists of three invisible 'mythical' rivers?

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6

The Saga of the Quest for the River Sarasvati

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There has been many a saga in the history of mankind that has captured the imagination of generations of humanity. In our millennium we speak of adventures of Marco Polo, Columbus' discovery of the shores of America, Amundsen's expedition to the North Pole, Vasco da Gama reaching the shores of Bharata and many more. All these look dramatic and fascinating when we realize they were undertaken more with courage and determination rather than with reliable information. For the pioneer who ventured in had very little information. They had only faith, determination and some sailor's tale to rely upon. But still their venture yielded enormous benefits in terms of the perspective of humanity about the world that they live in.

One such saga of recent times is the saga of the quest for the river Sarasvati. We will not go into the details of the greatness of the river Sarasvati and its innumerable mentions in the ancient texts of Bharata and the enormous data that has been generated in the last two decades to this august assembly for thanks to Sri Kalyanaramanji it has become a well known fact to all the historians of the world.

If one were to look back and see the formidable obstacles that one faced in trying to investigate the History of river Sarasvati.

The problems that the historians faced was:

1. Whether there was a real physical river called Sarasvati or was it just a myth, a poetic creation of the Aryans?

2. If such a river existed where did it flow and to trace its source course and goal.
3. If it did exit why, how and when did such a river disappear?
4. If it were to be an ancient river which is claimed to be the cradle of an ancient civilization, can we locate any archaeological evidences on the banks of such a river?
5. Adding to the confusion which was the reverential and emotive association with the River Sarasvati had made the Bharatiyas to identify the new rivers, no matter big or small, with the divine river Sarasvati itself. Thus the Haradvati that flows in the north-west region was Sarasvati. A branch of Ganga near Calcutta, a river flowing from Abu to Khambayat in Gujarat, the river that joins the ocean at the Prabhasa Kshetra all are called Sarasvati.

Under such a condition with a hostile atmosphere in the world of historians, which was bent upon to prove that the existence of river Sarasvati was just a myth and all literary evidences were figment of imagination and demanding material evidences as proof, there came a set of brave scholars under the banner of Bharatiya Itihasa Sankalana Samiti to have an in depth study of the saga of river Sarasvati.

Yes, we call them brave because they staked their international academic reputation to chase a myth and to prove a mirage a reality. The then academic world scoffed and laughed at this venture. Well, it did last for more than a decade. Most of those brave souls are no longer with us now to celebrate the fruition of their foundational quest. By this paper we try to pay our homage to them.

Even though all our appreciation, gratitude and admiration goes to the all encompassing pioneer work done by Sri Sridhara Vaman Wakanker and his team Sarasvati Samshodhana Mandal, as historians of Bharata it is our boundan duty to remember all those pioneers who have contributed their mite to the success of the 'Sarasvati Shodha' through the history of time. After all, the quest for river Sarasvati has a long history spanning nearly two centuries.

All scholars and lovers of Bharata and its heritage fell under the spell of river Sarasvati when they went through the vast ancient literature of Bharata. They did try their best to verify the physical existence of river Sarasvati with the tools that were available in those times.

The voluntary attempts of Oldham (1893), Wadia (1938), Amal Ghosh (1960), H.S. Parikh (1965), WilHelmi (1969), Alwin, Goudse, and Dr. Hegde (1978) definitely merit scholarly attention.

The well publicized and more extensive studies have been that of General Sir Cunningham, Arthur A. Macdonnel, A.B. Keith and Aurel Stein: who surveyed the invisible course of Sarasvati in 1942. In 1963, Dr. Narasimha Narayana Godbole surveyed the flow route of the Sarasvati in Rajasthan. Dr. M.A. Krishnan gives us in detail the course of the river Sarasvati in his work, *Geology of India and Burma*, published in 1968. Dr. M.N. Godbole's monumental work, *Rgvedic Sarasvati*, based on geological research throws more light on many of the ticklish problems associated with the river Sarasvati.

THE PRESENT QUEST: ITS ORIGIN

In 1981 (Samvat 2038), Babasaheb Apte Smarak Samiti, Nagpur was celebrating the District History Day at Kurukshetra, in the presence of Sri M.N. Pingale, the Working President of Babasaheb Apte Smarak Samiti. Sri M.N. Pingale drew the attention of the audience to the need and relevance of a research work on the lost Vedic river Sarasvati and the possible consequences of that research on the ancient history of Bharata.

Dr. Vishnu Sridhar Wakankar, the seniormost archaeologist of the country, explained with great fervor the archaeological importance of the issue. Immediately there was a vociferous demand from the audience for the setting up of a Samiti for a Quest after the lost Sarasvati. Thus, the All India Project of the 'Sarasvati Shodha' was born.

It took nearly four years to investigate, consolidate, plan and recruit eminent scholars to form a team to launch the 'Sarasvati Shodha' project. It was termed as 'Quest Mandal Expedition' and was inaugurated on Tuesday, the 19th Nov. 1985 (S 1907 Karthika Shudha 8) by the steersman of the Quest, Sri M.N. Pingale.

The Quest Mandal headed by Padmashri Dr. V.S. Wakankar, with a team of scholars belonging to all branches of knowledge, set out for Adi Badri in Himachal Pradesh – the presumed source of river Sarasvati. Points of fact were jotted down meticulously as and when they emerged during the visits. Photographs were taken wherever they were considered relevant. Audio tapes, about 19, were effectively put to use to collect highly important information related to the river. The notes thus prepared covered a canvas including literary sources, art, history, poetry, archaeological remains, oral observations, traditional references, etc.

The Quest team also recorded age-old stories and songs which were full of reverential references to the Sarasvati River from the 'Charans' who reside in Palloo, Bikaner and Karanidevi of Rajasthan. The *Charans*, as is well known in Bharata, make their living by singing folk-songs, folk-stories of the past heroes and legends.

Bharatiyas do believe in destiny and they feel in their heart that if any selfless action is initiated for the good of society, God will intervene to give a fillip to the success of that action. It so happened for the 'Sarasvati Shodha' project too.

While the Quest team was on its study tour, it was provided with clinching evidence about the dried-up river Sarasvati. The Arid zone research institute provided the team with all the authentic and scientific information on the river that was with them. It was literally a breakthrough in the quest for the river Sarasvati.

A NASA satellite launched in 1972 had taken pictures of a dried-up huge river which ran from the Himalayas to the Rann of Kachchh. The images had been analyzed by many scientists who were associated with scientific institutions of India but none had recognized its historical importance.

The compiled information handed over by Dr. Agarwal consisted of the studies done on this dried-up river bed by Bimal Ghose *et al.* (1979), Ramasamy, Bakliwal and Verma (1991), Yash Pal *et al.* (1980). This gave a powerful impetus to the quest as it had a more accurate scientific data regarding the course of the river and the time when it went dry.

The imageries sent by 'Landsat' disclosed the following:

1. The width of the Ghaggar Sarasvati bed was on an average of 6 to 8 km. from its entry in Punjab to today's Marot in Pakistan;
2. The course of Markanda River got diverted to north-east of Kshatrana. Even today the river Sarasvati flows through this route during rainy seasons.
3. The dried-up Y-2 route indicated the width of the present day Choutang River and its confluence with Ghaggar was taking place near Suratgarh.
4. It was clear that the ancient Ghaggar River got bifurcated near Anupgarh, with one branch getting lost near Marot and the other getting lost at Baireena. It meant that during that period the banks of Sarasvati River had spread towards these two places.

Incidentally, these details point to a possibility of the Vinashana Tirth in Sarasvati, where Balaram of the Mahabharata offered his reverence to his late father, which could be situated near about these two places.

The Quest team, therefore, decided to search for:

1. Information about the course of the river from Adi Badri through the plains and regions close to Sindhusagar.
2. Traces and collections of the remains and reminiscences in the surroundings.

But the search route as indicated by the 'Landsat' was a stupendous one as the dried-up bed was expansive. So, Dr. Wakankar studied the dried-up bed of Sarasvati with his fellow researchers from the archaeological point of view. Thus, their month-long quest was concentrated only on selected spots.

THE PILGRIMAGE

The Quest team went though Adi Badri, Ambala District, where the Sarasvati slides into the plains after crossing the mountainous area through Kanthghar and then to the Shivalik mountain ranges starting from Jagadhari (Yugandhara), beyond which stands the mountain Manu, where the Sarasvati, icy and hidden, flows as an undercurrent through the cracks, crevices and cleavages of the mountains. The team also visited Yamuna Nagar, Sarasvata Nagar (Mustafabad), and then on to Kurukshetra where the seed of the whole quest had been sown.

At Kurukshetra, under the guidance of Pandit Sthanudatta Sharma, the team went to the actual site of the river Sarasvati in the celebrated city. Remnants and reports related to the site gave the team enough information motivating them to study in depth the city of Kurukshetra in the context of the lost Sarasvati course.

Stone implements of the Prehistoric period were collected in a large quantities from all places visited by the team. Painted mud-pots of pre-Harappan period which are also available in the valleys of Sarasvati (Ghaggar) and Drshadvati (Choutang) at Bhagvanpur, Banavali, Sirisha, Mitthal, Raja Karn ka Keela, Doulatpur, Mirjapur, Sudha, Balu, Kudal, Agroha and nearby places. The team also did a close study of 20 to 30 metres long sand-dunes of Bikaner in relation to the Sarasvati bed.

In Gujarat the team visited Ambaji mountains where Bhel trees are in abundance and then the team went on to Koteshvar where one stream of the Sarasvati flows underneath. The river after playing hide and seek finally emerges on the surface at Siddapur to meet the Nalasarovar. This mountain range belonging to the range of the Ambaji mountains is known as 'Mainaka', the source of Gurjar Sarasvati.

Kunwar, on the banks of Nanuran (Nanukaccha), where the Sarasvati enters the ocean in sevenfolds (*saptadha*), was the next place of visit. Now 'Nanu' is a sandy desert. Near one of the seven streams, Dr. V.S. Wakankar found pieces of a egg of a 'Shakha Mrga' which helped him to conclude the period of Kunwar could be at least 25-50 thousand years BC.

Later, the team came across an old ocean coast harbour called Lothal which was an ancient city of Nanukaccha. A dockyard specially meant for

repair of ships was discovered there. Now there has been an in depth study of Lothal showing the maritime capabilities of our ancestors.

Travelling eastward, on the banks of the Gurjar Sarasvati of ancient times, the team came to the vicinity of the holy Somnath mandir – the junction of rivers Gautami, Hiranmayi and Sarasvati. Thus, the Quest pilgrimage drawn over a month's period, covering a distance of about 4000 km came to an end.

Curious it seems that this Quest did not end with just a report on the course, date and the civilization that prospered on its bank as it happens with almost all historical expeditions. The very possibilities of excavating the archaeological sites on the banks of Sarasvati and the challenge of proving whether this water mass, which was still flowing underground in most of the places, was really the same river and could it source be of Himalayan glacial origin evoked worldwide interest. Many teams of scientists came and did their own investigations leading to the confirmation of the existence of the river Sarasvati and proved that most of the narrative history of Bharat, be it folk or that of the Vedas, was factual.

The spin-off of this information was the opening of another avenue which has never been the forte of history. That was the task taken again by the Akhila Bharatiya Itihasa Sankalana Yojana under the title 'Sarasvati Nadi Shodh Prakalpa'.

The Prakalpa is now creating by trying to bring out the 'Gupta gamini Sarasvati' onto the surface, so that millions of hectares of parched land of Bharat can become green and give a living to over 20 crore people of north-west Bharata and also to make the devout of Bharat to take his holy dip in HIS sacred river Sarasvati.

The Prakalpa plans to create an establishment of a National Water Grid in order to reach the Brahmaputra flood waters to Kanyakumari making every river south of Vidhyas in India a perennial river (*jeevanadi*), creating a potential for adding 9 crore acres of additional wetland and four-crop cultivation with the availability of water round the year without a break. This revolution is to empower rural India of consisting of 6.5 lakh villages.

The revival of river Sarasvati is proceeding apace as part of the National Water Grid (Inter-linking of rivers, master plan drawn by National Water Development Agency) and the waters of Manasarovar flowing through rivers Sutlej and Beas have been taken into the Rajasthan Nahar (called Sarasvati Mahanadi Roopa Nahar). The Sarasvati Nahar waters have now reached up to Gadhra Road in Barmer District after traversing a distance of about 1000 km. Another 150 km. extension of this *nahar* will ensure that Sarasvati River waters will reach Rann of Kachchh and Gujarat.

The work has been going on in Haryana to revive the flow of waters in the course of Vedic river Sarasvati from Adi Badri to Sirsa.

As of April 2008, waters of Sarasvati from Manasarovar (Kailas parvatam) have already reached Gadhra Road, Barmer District. This has resulted in stopping the march of the desert, in greening of the desert by forests replacing sand-dunes in the Thar Desert and quenching the thirst of people in Rajasthan, in cities such as Jodhpur, Jaisalmer and Barmer. There is a victory tower erected at Mohangarh, 55 km. west of Jaisalmer (close to the border with Pakistan) and the inscription on the tower reads: Sarasvati Mahanadi Roopa Nahar. Glacial waters are now flowing beyond Mohangarh and into Barmer District Rajasthan.

Only 150 km of work has to be done to make the waters reach Gujarat and make it a historic moment in Bharatiya itihasa. Gujarat can share its Narmada waters with Barmer and Rajasthan can give Sarasvati waters to Gujarat. It will be a historic day indeed! About three years from now all citizens of India can take a dip in the holy river Sarasvati in Ahmedabad, Gujarat.

That is the ongoing saga of the river Naditama Sarasvati in a nutshell, a beginning of another legend.

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7

Use of Sarasvati Palaeo-Channels in Reclamation of Water-Logged Areas of Punjab and Haryana – A Concept Note

R.N. Athavale

INTRODUCTION

The states of Punjab and Haryana occur in the arid to semi-arid climate region, with average annual precipitation varying between 300 to 600 mm. The natural steady state equilibrium of this region, between water input in the form of precipitation, river inflow and sub-surface inflow on one side and surface and sub-surface outflow, bare soil evaporation and evapotranspiration on the other side, is disturbed since the arrival of canal irrigation, more than 100 years ago. The irrigation development culminated with establishment of the vast command area of the Bhakra-Nangal project. While irrigation of this fertile plains region of India has benefitted the nation with timely and stupendous increase in food production, there have been inevitable side effects, in terms of secular degradation of the soil productivity, due to the exacerbating problem of water-logging and salinization of soils, which now affects thousands of hectares of agricultural land.

Multiple cropping is practised in Punjab and Haryana. It is estimated that, in the case of paddy cultivation, approximately 50 per cent of the applied irrigation water deep percolates through the soil. The estimate for other crops is about 33 per cent of applied irrigation. In the absence of a commensurate natural capacity for sub-surface drainage and outflow, this has resulted in rise of the water table. The water table rises up to the crop

root level and causes reduction in crop yield. Some of the rising water evaporates and the salts dissolved in it are deposited in the soil, causing salinization of the soil and further degradation of its productivity. These phenomena are not unique to Punjab and Haryana. About 10% of irrigated land worldwide suffers from water-logging. However, as is described further, there might be a unique solution to our problem.

MAGNITUDE OF THE PROBLEM

Various estimates of the extent of water-logging and salinization in Punjab and Haryana are available. I quote from the treatise *Unravelling Bhakra*, by Dharmadhikary (2005). According to a 1990-91 statistical data, the water-logged and salt-affected areas in Haryana amounted to 2,49000 Ha and 1,97000 Ha, respectively. Corresponding figures for Punjab were 200,000 Ha and 490,000 Ha. The seriousness of the problem can be best highlighted by quoting the following two expert statements from the same treatise.

1. According to Bhamrah, the yields of paddy and wheat were 41% and 56% lower in affected lands.
2. As per Vinay Kumar, Vice Chancellor of the CCS Agricultural University at Hissar, the current estimate of saline and water-logged areas in the state of Haryana is around 400,000 Ha and if suitable measures are not taken , then the area with such problem is likely to be about 2,000,000 Ha in the next two to three decades. This dire prognosis means that 70% of the irrigated area in Haryana will be affected.

MEASURES FOR RECLAMATION OF WATER-LOGGED AND SALINISED AREAS

Three different methods are practised for draining out the sub-soil water and reclaiming the affected area. These are: 1. Vertical drainage, 2. Surface drainage, and 3. Sub-surface drainage. Dharmadhikary (2005) has evaluated the efficacy of these three methods in the context of Punjab and Haryana, in a chapter devoted to 'Water-logging and Salinisation' in his treatise on the Bhakra project.

1. **Vertical drainage:** Vertical drainage comprises extraction of groundwater, for use in conjunctive irrigation, with resultant lowering of the local water table. This is being practised on a large scale. However, this solution is advisable only in areas where the groundwater is of good quality. It should not be used in areas where the groundwater is inherently brackish or saline, because of geological and palaeoclimatic reasons. The Central

Ground Water Board (Annonymous, 1997), has prepared a groundwater quality map of the country. This map delineates such areas in Punjab and Haryana. Even in areas having good quality groundwater, one should note that groundwater is a replenishable but finite source and is not being naturally replenished at the same rate at which it is being extracted at present. Further, the fraction of groundwater (50 to 33 per cent of the irrigation quantum) that percolates back has an increased content of total dissolved solids, because of evaporation effects. It seems, therefore, that the vertical drainage measure can work only in some of the affected area and here also, it cannot be a long-term solution.

2. **Surface channels**: These field drainage cuts, by definition, are not more than 1 to 2 metres deep. They can be used for collecting excess water accumulated on the surface and releasing it in a canal, for ultimate disposal outside the command area. Reluctance of the farmers to surrender land to allow the drains to pass through, and their apprehension about seepage of poor quality water in their farms are some of the difficulties encountered in this method of reclamation.
3. **Sub-surface drainage:** In this method, a network of vertical, inclined and near-horizontal perforated pipes is buried underground to drain out the excess water in a sump and then disposed in another outlet. This method is extensively practised in Netherlands and a pilot project, with assistance from Netherland, has been implemented in Haryana.

A common denominator in large scale application of any one or a combination of these methods is the problem of disposal of the drained water, outside the affected area. Solutions such as pressure injection of this water in deep boreholes or releasing it in large man made pans, having impervious linings, have been suggested. However, most experts agree that construction of a long interstate canal, for its disposal in the Gulf of Kachchh, is a permanent, although expensive, solution of the problem.

THE SARASVATI SOLUTION

The ancient Sarasvati originated in Himachal Pradesh, entered Haryana near Kalka, moved through Punjab and Haryana into Rajasthan, meandered and wound further downstream, till it debouched in the Gulf of Kachchh. The river is currently known as Ghaggar River in its upper reaches. The Ghaggar is an ephemeral stream. Several major and minor tributaries joined

the Sarasvati over its course. The Sarasvati River system can be considered as a separate entity and not as a part of the Indus basin. It dried up a few thousand years back, due to tectonic movements, tributary diversions and climate changes. This thesis is now well documented and accepted by almost all, barring a few skeptics. The dry courses of the main river and its tributaries are at present covered with sand, loam and silt, deposited by wind over last few thousand years. They could be discerned only after the advent of Remote Sensing techniques (A.V. Sankaran, 1999; Roy and Jakhar, 2001).

It is reported that the currently obscure Sarasvati was a mighty river, with bank to bank width varying from 6 to 10 km and filled with pebbles, gravel, coarse sand and fine sand, like any other river bed (Kalyanaraman, S., Internet blog). The river channel should also be proportionately deep. All such river bed material constitutes a highly permeable medium, which should be present all along the river course, and have a natural down gradient. We thus have a subterranean channel(s) system with considerable capacity to store and transmit water.

The problem of disposal of the water drained out from the thousands of hectares of water-logged, salinised and erstwhile fertile areas of Punjab and Haryana (and similarly affected irrigated parts of Rajasthan), is considered as the most difficult aspect of reclamation through manmade sub-surface drainage. It is suggested here that the presently dry and pristine sub-surface beds of the Sarasvati and its tributaries in the desert area, can be used to dispose off the water collected through a network of sub-surface drains. The quality of this water will be poor in the initial stages but will improve in course of time. This approach, prima facie, seems less expensive and faster than the alternative approach suggested by some – of taking the drained water all the way southwest, to the sea, through a lined canal.

It is proposed through this concept note that a study group, for evaluating the technical feasibility, environmental impact, inter-state transfer issues, cost/benefit ratio and other relevant aspects, may be constituted and a pilot experiment may be undertaken, at a site in the palaeo-channel of the Sarasvati. If the report of the study group is favourable and is followed by an action plan, then we might see a rejuvenation of the Sarasvati River, besides achieving reclamation of the affected agricultural lands.

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Culture and Archaeology

8

The Sarasvatī: The Mother of Indian Civilization*

B.B. Lal

I am indeed most grateful to the organizers of this Seminar, in particular to revered Swami Dayanand Sarasvati, Dr. S. Kalyanaraman, Professor Shivaji Singh and Dr. Sharad Hebalkar, for so kindly inviting me to deliver the Inaugural Address. This has given me an opportunity to express my views before such an august audience on the civilization that was at its peak in the Sarasvatī basin and beyond in the 3rd millennium BCE and had its roots deep into the 5th millennium BCE, if not earlier. No less important is the fact that this civilization has made a lasting contribution to Indian culture, as may be observed in the various walks of life even today.

Just as a mother gives birth to a child and nourishes it till it comes of age, so did the Sarasvatī give birth to this Indian Civilization and nourish it. Unfortunately, however, in the latter case, the mother disappeared not long after raising the child up to its adulthood, leaving some non-believers to doubt even her identity. What an irony!

One of these non-believers, the noted historian Professor R.S. Sharma, who was in limelight during the middle of the 1990s as a Babri Masjid protagonists, had the 'generosity' of making the following remarks (Sharma 1999: 35):

> The **fundamentalists** want to establish the superiority of the Sarasvatī over the Indus because of **communal** considerations. In the Harappan

* Inaugural Address delivered at the International Seminar on 'Sarasvatī River and Hindu Civilization', held at India International Centre, New Delhi, October 24-26, 2008.

context they think that after the partition the Indus belongs to the Muslims and only the Sarasvatī remains with the Hindus.

What an unfounded accusation! Anyway, the learned Professor goes on to say:

> The Sarasvatī receives much attention in the *Ṛg Veda* and several *sūkta*s are devoted to it; so they want to use it for their purpose. But it seems that there are several Sarasvatīs and the earliest Sarasvatī cannot be identified with the Hakra and the Ghaggar. In the *Ṛg Veda* the Sarasvatī is called the best of the rivers (*nadītama*). It seems to have been a great river with perennial water. The Hakra and the Ghaggar cannot match it. **The earliest Sarasvatī is considered identical with the Helmand in Afghanistan which is called Harakhwati in the *Āvestā*.**

First and foremost. Let it be remembered that we are looking for the physical equivalent of the **Ṛigvedic Sarasvatī** and not for any sundry river going by that name or a name phonetically similar to that. Thus, it is imperative that we take into full account what the *Ṛigveda* itself has to say about the location of this river.

Verses 5 and 6 of the famous *Nadī-stuti* hymn of the *Ṛigveda* (10.75.5-6) describe the various rivers known to the Vedic people, in a **serial order** from the east to the west, i.e. from the Gaṅgā-Yamumā to the Indus and its western tributaries. In this enumeration, the **Sarasvatī is mentioned between the Yamunā and the Sutlej.** The relevant verses run as follows:

imam me Gaṅge ***Yamune Sarasvati Śutudri*** *stomam sachatā Paruṣṇyā/*
Asiknyā Marudvṛidhe Vitastayā Ārjīkīye śṛiṇuhyā Suṣomayā//5//
Tṛiṣṭāmayā prathamam yātave sajūḥ Susartvā Rasayā Śvetyā tyā/
Tvam Sindho Kubhayā Gomatīm Krumum Mehatnvā saratham yābhirīyase// 6//
O Gaṅgā, **Yamunā, Sarasvatī, Śutudrī (Sutlej)** and Paruṣṇī (Ravi), O Marudvṛidhā with Asiknī (Chenab), O Ārjikīyā with Vitastā (Jhelum) and Suṣomā (Sohan), please listen to and accept this hymn of mine.// 5 //
O Sindhu (Indus), flowing, you first meet the Tṛiṣṭāmā (and then) the Susartu, the Rasā, and the Śvetā (Swat), and thereafter the Kubhā (Kabul), the Gomatī (Gomal), the Krumu (Kurram) with the Mehatnu; and (finally) you move on in the same chariot with them (i.e. carry their waters with you).// 6 //

Does the Harakhwatī of the *Āvestā*, identified by Sharma with modern Helmand in Afghanistan, foot <u>this unambiguous geographical bill</u>? Surely, not. There is no Yamunā or Sutlej in Afghanistan to sandwich the supposed Sarasvatī (Harakhwati).

Further, *RV* 3.23.4 mentions the **Dṛiṣadvatī and Āpayā as the tributaries of the Sarasvatī:**

Dṛiṣadvatyām mānuṣa Āpayāyām Sarasvatyām revadagne didīhi//

There are no rivers by these names in Afghanistan. On the other hand, these two rivers **are** located in Haryana and Rajasthan in India.

Finally, there is the oft-quoted hymn, *RV* 7.95.2:

ekāchetat Sarasvatī nadīnām śuchir yati giribhya ā samudrāt/

which clearly states that the **Sarasvatī flowed all the way from the mountains to the ocean. While there do exist mountains in Afghanistan, <u>there is no ocean</u>. Then, how does one make the Helmand (the supposed-to-be Sarasvatī) fall into the ocean and conform to the geographical description in the *Ṛigveda*?**

The above quotations from the *Ṛigveda* itself make it abundantly clear that the Helmand of Afghanistan can have no claim whatsoever to be equated with the Ṛigvedic Sarasvatī!

Anyway, letting Professor Sharma and others of the same ilk stick to their guns, if they choose do so even after the above discussion, we may now turn our attention to a more positive note, viz. if the Helmand of Afghanistan is not the Ṛigvedic Sarasvatī, which river in India does foot the bill? In doing so, we shall apply all the three tests referred to above, namely: (i) the location of the said river between the Yamunā and Sutlej; (ii) the existence of the Dṛiṣadvatī and Āpayā as its tributaries; and (iii) the given river having flowed into the ocean.

There does flow a river **called the Sarasvatī** between the Yamunā and Sutlej and thus passes the first of these tests. Today it starts at the foot of the Siwalik hills and flows via Panjab into Haryana where it passes by the towns of Pipli, Kurukshetra and Pehowa, after which it merges into the Ghaggar and is known downstream by the latter name. It then dries up near Sirsa. Thereafter the dry bed, which varies in width from 2 to even 8 kilometres at places (Yash Pal *et al.* 1984), is traceable all the way, cutting across the Indian border into Cholistan (Pakistan) where it is called the Hakra. On its having flowed through Sindh down to the sea, we quote from a recent study by Louis Flam (1999):

> From Fort Derawar to the south, the **Hakra** can be aligned with the Raini and Wahinda remnants, which subsequently connect with and blend into the Nara channel. ..... In addition to the Sindhu Nadi [Indus], **the Nara Nadi has been recognized as an exclusive perennial river which flowed in the north-eastern, east-central and south-eastern portions of the lower Indus basin during the fourth and third millennia BC. .....**

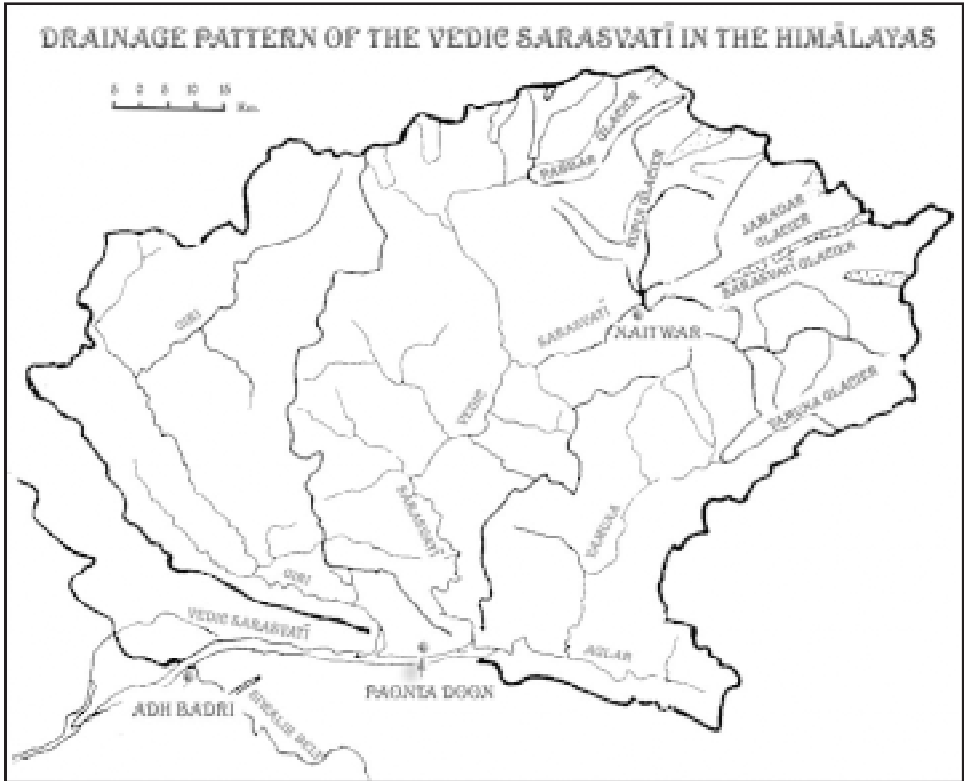


Fig. 1. Drainage Pattern of the Vedic Sarasvatī in the Himalayas.

> **Available evidence suggests that during the fourth and third millennia the delta of the combined Sindhu Nadi and Nara Nadi was located near the Rann of Kachchh on the eastern side of the Lower Indus Basin to somewhere between Hyderabad and Thatta in Sindh.**

This fulfills the third condition.

As to the second one, the Dṛiṣadvatī, also now as dry as the Sarasvatī itself, has been identified with the modern Chautang. Passing by the towns of Bhadra, Nohar, etc., it joins the Sarasvatī-Ghaggar combine near Suratgarh. We append three maps (Figs. 1, 2 and 3) which show respectively: the origin of the Sarasvatī from the Himalayan glaciers; its location between the Yamunā and Sutlej on the plains (along with its tributary, the Dṛiṣadvatī); and its ultimate flow all the way down to the ocean.

The foregoing data, therefore, leave no doubt that the Sarasvatī-Ghaggar combine, which is now dry beyond Sirsa but flowed in ancient times all the way down to the sea, <u>is none other than the Ṛigvedic Sarasvatī</u>. (Cf. Lal 2002: 1-24.)

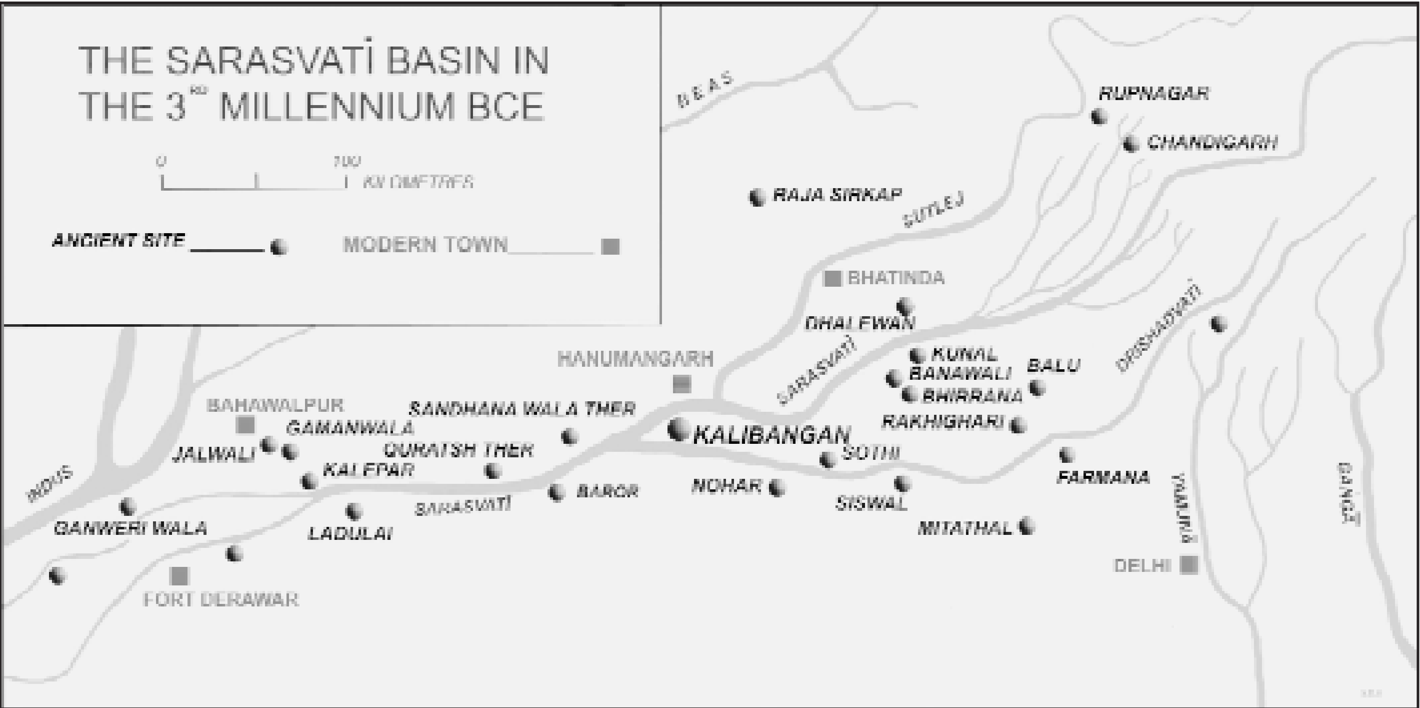


Fig. 2. The Sarasvatī Basin in the 3rd Millennium BCE.

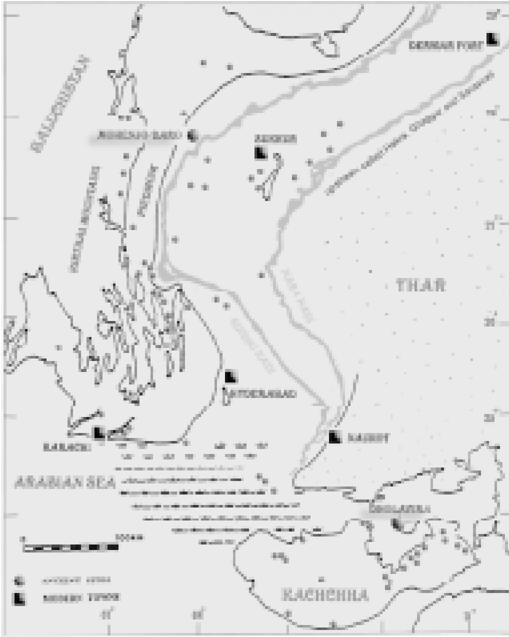


Fig. 3. Lower Sindh and Kachchha in the 3rd Millennium BCE.

While Professor Sharma can take delight in aiming his arrows at those whom he dubs as 'fundamentalists' (quoted above), would he like to use the same adjective for persons like C.F. Oldham (1893) and A. Stein (1942) who too have no hesitation in identifying the Ghaggar-Hakra combine with the Ṛigvedic Sarasvatī ? In fact, Stein's 1942-paper even bears the caption, 'A Survey of Ancient Sites along the "**Lost**" **Saraswati River**'.

In the basin of this Ṛigvedic Sarasvatī, westwards up to the Indus and even down to Gujarat, there flourished in the third millennium BCE a mighty civilization which in many ways overshadowed some of the other contemporary civilizations of the ancient world. Having been excavated first at Harappa, this civilization came to be known as the Harappan Civilization. With the excavations at Mohenjo-daro on the Indus, it was given a name after that river. During the past five decades, hundreds of sites have been discovered in the Sarasvatī basin in India and Pakistan and thus a new name has come into vogue, namely the Indus-Sarasvatī Civilization. Indeed, call it by any name, the rose will always smell sweet!

Excavated on the Indian side, one may refer to a few important sites: viz. Kalibangan, Banawali, Rakhigarhi, Dhalewan, Rupnagar, Kunal and Bhirrana (Fig. 2). Each one of these has added something new to our knowledge since the days when Harappa and Mohenjo-daro were excavated. But here we shall refer only briefly to some of these discoveries.

Kalibangan, located on the left bank of the Ghaggar in Hanumangarh District of Rajasthan, has shown for the first time that not only was the smaller part of the settlement, called the 'Citadel', fortified but the larger one, known as the 'Lower Town', as well (Fig. 4). Subsequent excavations at many of the other sites on the Sarasvatī, mentioned above, as also those in Gujarat in India and even at Harappa itself in Pakistan, have shown that the putting up of fortifications around both the units of the settlement was

indeed a normal feature with the Harappans. Further, the streets at Kalibangan show that in width these bore an *inter se* ratio of 1:2:3:4, the actual measurements being 1.8, 3.6, 5.4 and 7.2 metres. What a meticulous layout!

These sites have also negated the one-time theory that the Harappan Civilization was 'monotonous'. Indeed, each site has shown its own features in respect of the integration of the two units, namely the 'Citadel' and the 'Lower Town'. Though not located in the Sarasvatī valley, we may draw attention to Dholavira in Gujarat (Bisht 1991), which consisted of three units, viz. the Citadel, the Middle Town and the Lower Town. Such divisions of the settlement do call for a re-assessment of the socio-political set-up of the Harappan Civilization.

Kalibangan has brought to light a sizeable settlement which preceded the Mature Harappan stage. But even this settlement was fortified. Further, two no less remarkable observations were made about this Early Harappan township. First, it was the discovery of an agricultural field (Fig. 17), laid

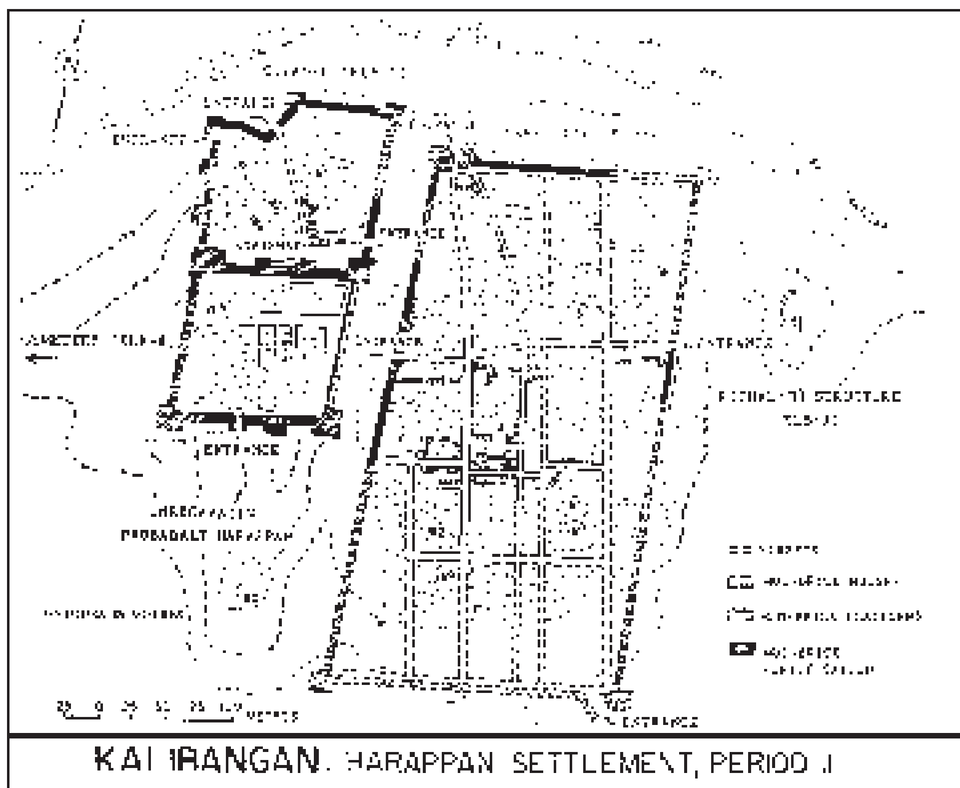


Fig. 4. Kalibangan: Harappan settlement, Period II (Mature Harappan).

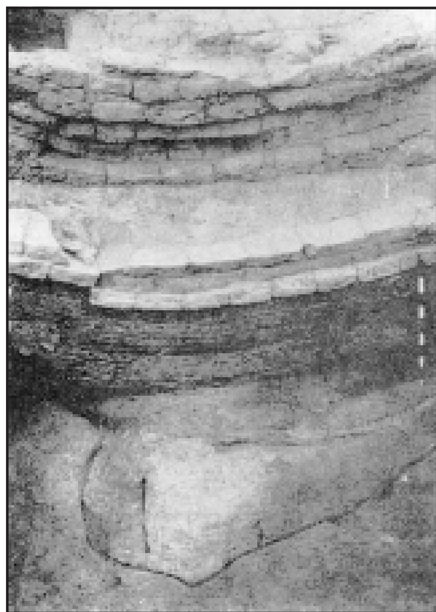


Fig. 5. Kalibangan: Faulted strata and walls of the Early Harappan Period, resulting from an earthquake.

out on a criss-cross pattern, with the widely-distanced furrows running north-south and the narrower ones east-west – a pattern which is in vogue even today in Rajasthan and Haryana. These days the farmers grow mustard in the widely-distanced furrows and grams in the other; and one can well imagine a similar pattern of crops having existed during the Harappan times. **Incidentally, the Kalibangan agricultural field is the earliest of its kind ever brought to light through an excavation.**

The Early Harappan settlement at Kalibangan, which began some time at the beginning of the 3rd millennium BCE, was brought to an end by an earthquake, as evidenced by faulted strata and ruptured walls (Fig. 5). Datable to around 2700 BCE, **this is the earliest earthquake ever to have been identified in an excavation.**

Kalibangan does not stand alone in yielding the remains of the Early Harappan settlement. Most of the other sites mentioned in an earlier paragraph have also done the same. Indeed, Rakhigarhi (Nath 1998-99) has thrown up nearly 4.5 metres of Early Harappan deposits, which cry for a horizontal excavation in order to throw further light on this stage. Kunal (Khatri and Acharya 1995) is yet another site which is noteworthy in this respect. It has given evidence that at the beginning the people lived in pit-houses and thereafter constructed over-ground houses made of mud bricks. Their pottery, having a red surface, was painted in black outline with white in-filling. The designs included the pipal-leaf and peacock (Fig. 6) which at once remind us of their Mature Harappan counterparts. Even in the Early Harappan Stage, the people used seals though these were not inscribed as were the (later) Mature Harappan ones. Further, what is most remarkable is the discovery of silver ornaments from within a pot in a large-sized house. These included 'two tiaras, one small and one large, each with a fully opened flower having petals topped with a decoration'. The excavator has a reasonable case in thinking that these may have belonged to the chieftain of the settlement – throwing light on the then political set-up. As the

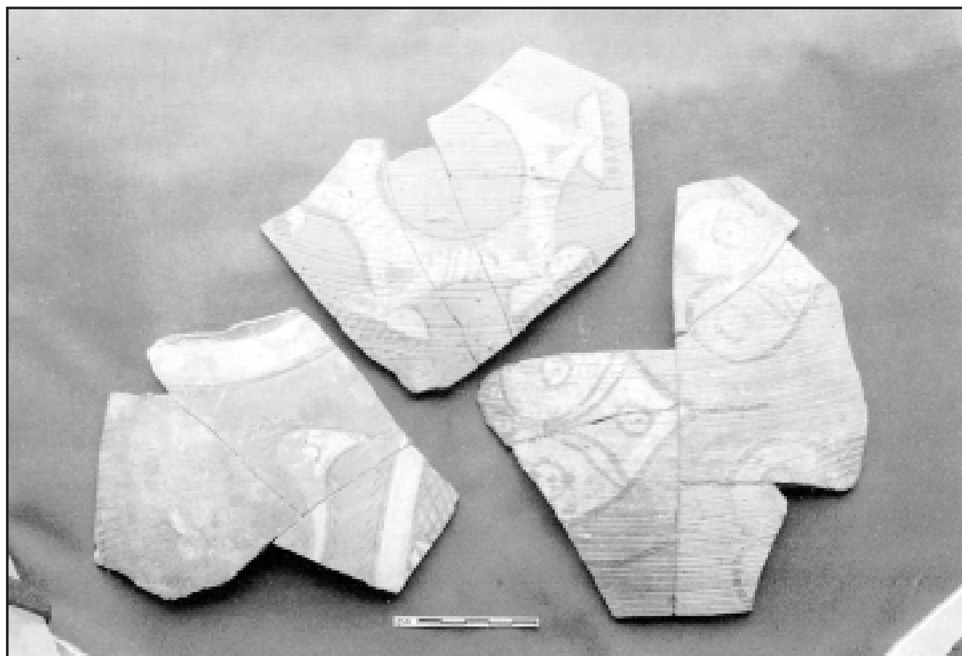


Fig. 6. Kunal: Pottery, painted with two colours: black outline and white in-filling. Early Harappan.

Carbon-14 dates suggest, the settlement at Kunal may well have begun in the last quarter of the 4th millennium BCE.

We now turn our attention to Bhirrana which has yielded sizeable remains of a stage which is clearly earlier than that of earliest Kunal. It is characterized by a pottery known in archaeological terminology as the Hakra Ware, first identified at sites in the Hakra (Sarasvatī) valley in Cholistan. The Birbal Sahni Institute of Palaeobotany, Lucknow has provided the following C-14 dates for the early (not the earliest) levels of the site (Rao *et al.* 2005).

Sample No. BS 2314. Calibrated age: 1 Sigma 4770 (4536, 4506, 4504 BC) 4353 BCE
Sample No. BS 2318. Calibrated age: 1 Sigma 5336 (5041) 4721 BCE
Sample No. BS 2333. Calibrated age: 1 Sigma 6647 (6439) 6221 BCE

Even if we temporarily ignore Sample No. BS 2333, the other two samples clearly show that **the ancestry of the Harappa Culture in the Sarasvatī Valley goes back to the beginning of the fifth millennium BCE.** For all one knows, further field-work in the Sarasvatī basin – which is a crying need of the hour – may reveal a stage earlier than that of the Hakra Ware !

With its roots going as deep as the fifth millennium BCE (if not earlier), it is evident that the Indus-Sarasvatī Civilization was the product of the local people. In other words, **it was indigenous** to this country and thus its authors too, to borrow an expression, were the 'sons of the soil'. But who were these authors?

In looking for the authors, the Ṛigvedic Sarasvatī, once again, plays a vital role. And here is how it does. To recall, on the bank of this now-dry Sarasvatī river is situated Kalibangan, a noteworthy site of the Indus-Sarasvatī Civilization. When in 1960s the excavations over here were in progress, we were naturally keen to ascertain the reasons for the drying up of this river, since it was obvious that the massive settlement at Kalibangan could not have flourished without the adjacent river having been alive and active. With this end in view, a project, combining the efforts of the Archaeological Survey of India, Geological Survey of India and an Italian firm named Raikes and Partners (headed by R.L. Raikes), was set in motion. Bore-holes were dug in the river-bed, which brought to light a greyish sand at a depth of about 11 m below the present flood-plain; and it was 'very similar in mineral content to that found in the bed of the present-day Yamuna'. This clearly indicates that the source of the Ghaggar-Sarasvatī lay high up in the Himalayas from where the Yamunā also originated, thus making the sand identical in the two cases. However, no less important was the revelation that, as explained by Raikes in his 1968-paper, 'Kalibangan: Death from Natural Causes', **the Harappan settlement at Kalibangan came to a sudden end because of the drying up of the Sarasvatī**.

How did the Sarasvatī dry up? Geologists (Puri and Verma 1998) have shown that as the result of a major seismic activity in the Himalayan region there rose up the Bata-Markanda Divide which is as much as 30 metres in height (Fig. 7). It blocked the westward flow of the Sarasvatī and forced the water back. Since not far off there was the Yamunā Tear opening, the water found its exit into the Yamunā system. Thus, the Sarasvatī was left high and dry, with the consequential abandonment of its valley by the Mature Harappans. They moved north-eastwards into the region between the upper reaches of the Yamunā and Gaṅgā, as evidenced by the occurrence of hardly a few Mature Harappan but many Late Harappan sites in that region.

It is also interesting to note that the drying up of the Sarasvatī finds a mention in the later Vedic literature as well. Thus, says the *Pañchaviṁśa Brāhmaṇa* (XXV.10.16): 'At a distance of a journey of forty days on horseback from the spot where the Sarasvatī is lost (in the sands of the desert), (is situated) Plakṣa Prāsravaṇa'. (Caland's translation 1931, reprint 1982, p. 636).



Fig. 7. Appearance of the Bata-Markanda Divide.

The next question is: Is it possible to date the drying up of the Sarasvatī? As just mentioned, the Mature Harappan occupation at Kalibangan had to be given up suddenly because of the stoppage of water-supply consequent on the drying up of the adjacent river. **The radiocarbon dates show that this abandonment of Kalibangan took place around 2000 BCE (Lal 1997: 245-46). It follows, therefore, that this was approximately the time when the Sarasvatī dried up.**

We now pass on to the most significant outcome of the foregoing data. **Since during the Ṛigvedic times the Sarasvatī was a mighty flowing river but it dried up around 2000 BCE, the *Ṛigveda* has got to be earlier than 2000 BCE.** How much earlier – by 500 years, 1000 years or even more – it is anybody's guess.

What are the ramifications of such a dating of the *Ṛigveda* in terms of history? To recall, according to the famous *Nadī-stuti Sūkta* of the *Ṛigveda* (*RV* 10.75.5-6, quoted earlier), the area occupied by the Ṛigvedic Aryans extended from the upper reaches of the Gaṅgā-Yamunā on the east to the Indus and its western tributaries on the west. Now, if a simple question is posed, viz. which archaeological culture flourished in this very area during the pendency of the Ṛigvedic times, i.e. prior to 2000 BCE, **the inescapable**

answer will have to be: The Indus-Sarasvatī Civilization – none else. In other words, the Indus-Sarasvatī Civilization and the *Veda*s are just two faces of the same coin (see Map, Fig. 8).

As discussed earlier, the C-14 dates from Bhirrana show that **the Indus-Sarasvatī Civilization was indigenous. It thus becomes a natural corollary, arising from what has just been stated in the preceding paragraph, that**

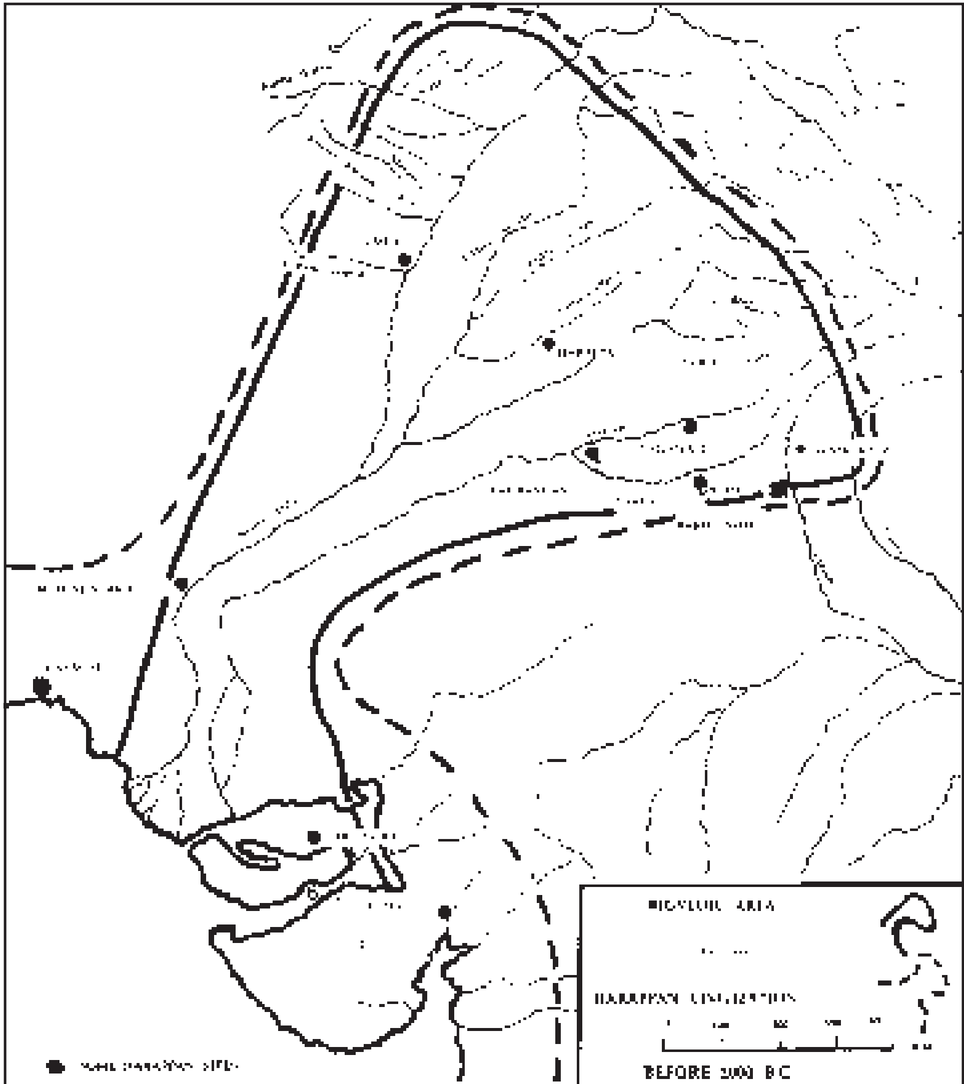


Fig. 8. Map showing a correlation between the Ṛigvedic area and the spread of the Harappan Civilization, before 2000 BCE.



Fig. 9. The Asthanas: Mark the *sindūra* (vermilion) in the *māṅga* (central partition-line of the hair on the head) of the lady – a sign of her marital status.

the authors of the *Veda*s were indigenous and not 'invaders' or 'immigrant' as held by some scholars.

And now to the final question: Did this Indus-Sarasvatī Civilization die out or has it left any impress on the Indian civilization? Writing in 1947, Mortimer Wheeler asserted as follows:

> What destroyed this firmly-settled civilization? Climatic, economic, political deterioration may have weakened it, but its **ultimate extinction** is more likely to have been completed by deliberate and large-scale destruction. It may be no mere chance that at a late period of Mohenjo-daro men, women and children appear to have been massacred there. **On circumstantial evidence Indra stands accused.** (Emphasis added.)

A detailed analysis of Wheeler's statement has been made by many scholars (e.g. Dales 1964; Lal 2002: 69-70; Renfrew 1988: 188 &190)

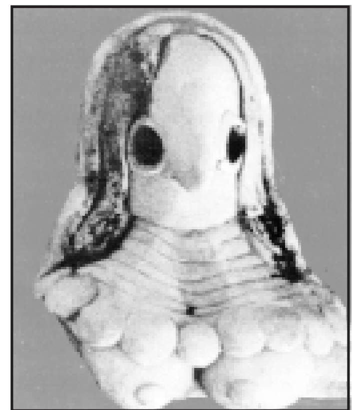


Fig. 10. Nausharo: Terracotta female figure, painted. The yellow colour on ornaments suggests that these were made of gold; the hair is black, while the red on the line of partition of the hair indicates the use of vermilion. Period IB, 2800-2600 BCE.

and it is not proposed to cover the ground all over again. In summary, there is no case for an 'Aryan Invasion' nor for the 'extinction' of the Indus-Sarasvatī Civilization. Further, as fully explained in my Inaugural Address delivered at the 19th International Conference on South Asian Archaeology, held at University of Bologna, Ravenna, Italy, July 2-6, 2007, there is also no case for an 'Aryan Immigration' (supposedly from the Bactria-Margiana region). (Cf. Lal 2007.)

There is no doubt that the Indus-Sarasvatī Civilization did not continue *ad infinitum* in its 'Mature' form; and this is most normal to happen to any civilization. With over-exploitation of agricultural land, change of climate, the drying up of the Sarasvatī river, sharp fall in internal as well as external trade and allied reasons, all the trappings of urbanism, such as meticulous town-planning, weights and measures, seals and sealings, the system of writing, etc. began to disappear from the scene. The cities made way for villages which, as I have stated elsewhere, must have whispered to one another: 'Cities may come and cities may go, but we go on for ever'. But in this urban-to-rural reversal, the down-to-earth way of life still continued unhindered. I have given a detailed exposition of this remarkable phenomenon in my 2002-book, *The Sarasvatī Flows on: The Continuity of Indian Culture* and it is not proposed here to take much of the precious time of the audience, dilating on the subject. However, to put it succinctly, there is no walk of life in which the cultural continuity is not reflected, whether it be make-up by ladies, agricultural activities, food-habits, games, bed-side stories narrated by the grandmother to the children, religious worship and so on. To save time, I shall straightaway pass on to just a few photographs/ drawings to illustrate my point.

Thus, while Fig. 9 shows a modern lady (Shrimati Kiran Asthana along with her husband Air Marshal T.P. Asthana), with *sindūra* (vermilion) in her *māṅga* (central partition-line of the hair on the head) – a sign of her marital status, Fig. 10 show a terracotta figurine from Nausharo, datable to 2800-2600 BCE, with the same feature. In this case, while the vermilion is shown in red colour, the hair is done in black and the ornaments in yellow, suggesting that these were made of gold. Fig. 11 shows the famous bronze damsel from a Mature Harappan level of Mohenjo-daro. On her left arm she wears a series of bangles – a feature still to be seen amongst women of Rajasthan, Haryana and elsewhere (Fig. 12). Likewise, the gold cone discovered at Mohenjo-daro (Fig. 13), called *chauk* in Hindi, is still used by ladies in Haryana and Rajasthan (Fig. 14). Even cosmetic gadgetry is no exception. Thus, while in Fig. 15 may be seen a three-in-one gadget of copper from Harappa, the next figure (Fig. 16) shows a modern example of the same. Of the three objects, the pointed one is used for cleaning the spaces

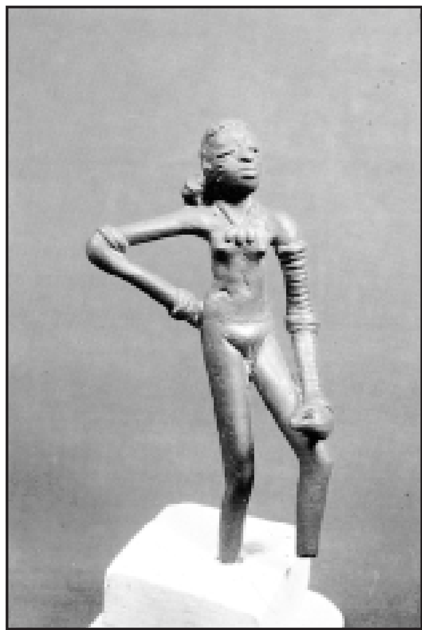


Fig. 11. Mohenjo-daro: the famous bronze figure of a 'dancing girl', wearing spiralled bangles on the upper left arm. Mature Harappan.

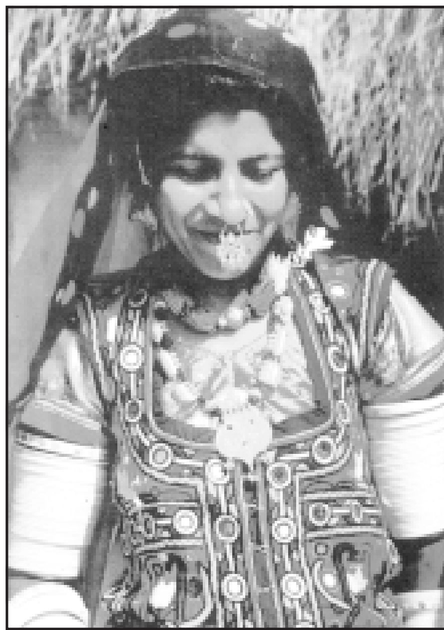


Fig. 12. A Woman wearing spiralled bangles.

between the teeth, the cup-ended tool is used for taking wax out of the ears, and the tweezers for picking up tiny hair that often grow in old age on the inner side of the eyelids.

The rural people in Rajasthan and Haryana even today plough their agricultural fields in the same style as did their forefathers 5000 years ago. Fig 17 illustrates an Early Harappan field, discovered at Kalibangan and ascribable to circa 2800 BCE. It has two sets of furrows, cutting each other at right angles. Of these, the ones with a much greater intermediary distance (1.9m) run north-south, while the others with a much lesser distance (30 cm) run east-west. It is surprising, yet true, that

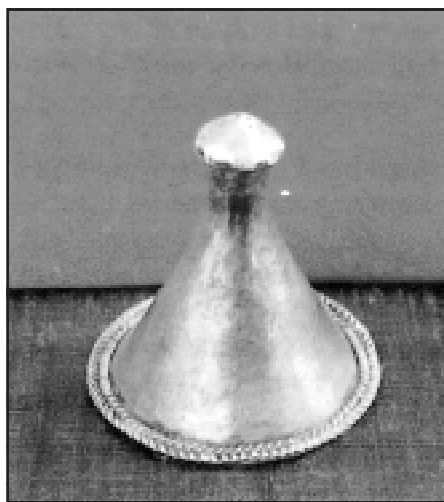


Fig. 13. Mohenjo-daro: Gold cone. Mature Harappan.



Fig. 14. A newly married lady, on the right, wearing a conical ornament on the head (covered by the *dupattā*). She also wears bangles all over her right arm.

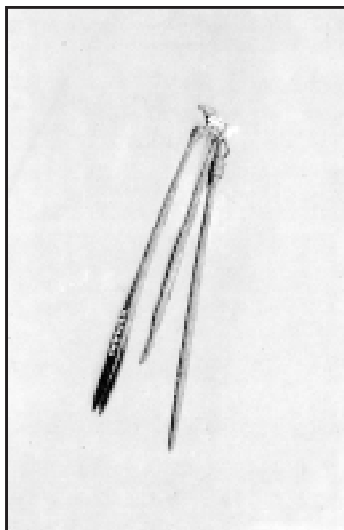


Fig. 15. Harappa: A three-in-one toiletry gadget, copper. Mature Harappan.



Fig. 16. A modern three-in-one toiletry gadget, copper.

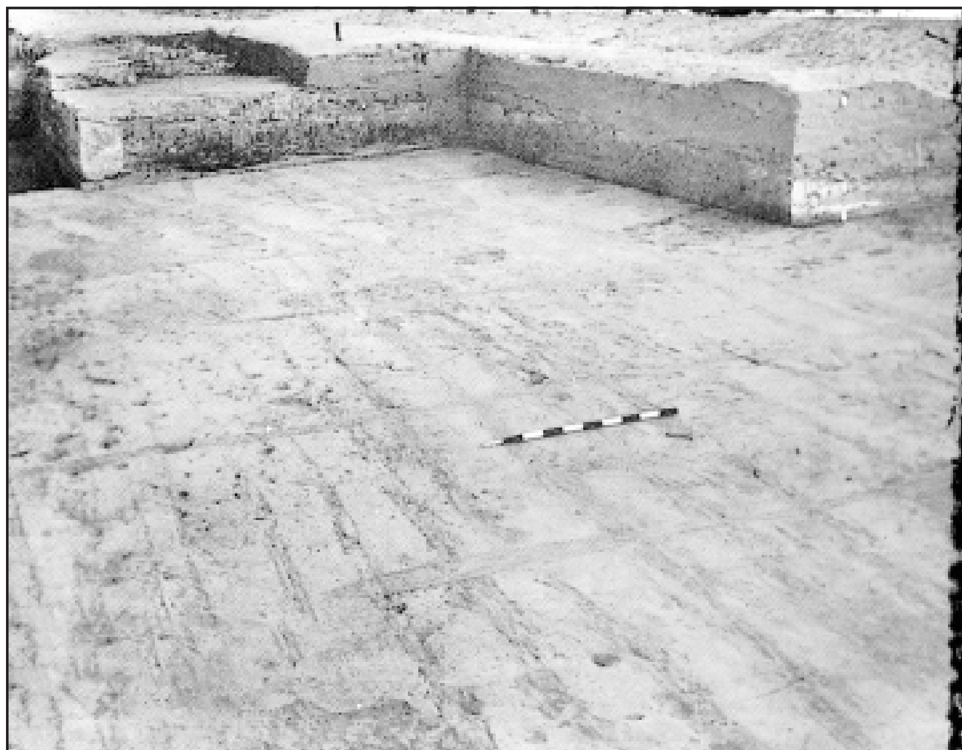


Fig. 17. Kalibangan: An agricultural field, showing criss-cross pattern of the furrows. Early Harappan.

the same pattern is followed even today by the peasants (Fig. 18). Fig. 19 shows the kind of crops sown in these respective furrows: mustard in the wide-distance ones and gram in the others. It is most likely that the Harappans also did the same. Continuing with the rural scenario, we find that the bullock-carts of today are built on the same pattern as were the Harappan ones. But that is not all. At Harappa were discovered cart-tracks, beneath the Cemetery H and thus ascribable to the late 3rd millennium BCE. It is astonishing, yet once again true, that the gauge computed from these tracks is exactly the same as that in the case of modern Sindhi carts!!

Grandmothers often take the grandchildren to their beds and before putting them to sleep narrate some fairy tales. The paintings discovered on the pots at Lothal, the well-known Harappan site in Gujarat, bring out some of these stories and here we shall draw attention to one. Fig. 20 shows, from the left a crow, a pitcher, a tree, a deer and again a tree. The story depicted is a well known one, viz. that of 'The thirsty Crow'. According to it, briefly, a thirsty deer came across a pitcher with some water in it. He tried to drink water from it, but his long antlers did not permit him to put



Fig. 18. Around present Kalibangan village: The system of ploughing the field, which also has the criss-cross pattern of the furrows.



Fig. 19. Around present Kalibangan village: A field with mustard plants in the widely distanced furrows and those of gram in the others.

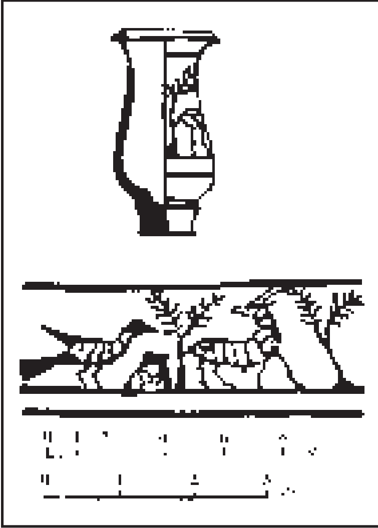


Fig. 20. Lothal: A vase, the painting on which probably depicts the folk tale, 'The Thirsty Crow'.



Fig. 21. Mohenjo-daro: Impression of a seal depicting a seated figure surrounded by animals, believed to be Śiva in his aspect of *Paśupati* (Lord of Animals). Mature Harappan.

his head inside it. Disappointed, he was about to leave. Just then, a thirsty crow appeared on the scene. Even on finding that the water inside the pitcher was at a low level, he did not lose courage. He picked up tiny pebbles from nearby and dropped them into the pitcher. As the level of the water rose, he drank it to his content. The painting shows the crow just withdrawing his beak from the pitcher and the bewildered deer looking back at the former.

Religion is again something that gets deeply ingrained in human psyche and its elements continue generation after generation. We all know about the depiction of a figure on a seal from Mohenjo-daro which has been identified with Śiva, in the form of Paśupati (Fig. 21). But the discovery of a terracotta *liṅga*-cum-*yoni* from a Harappan level at Kalibangan (Fig. 22) re-confirms the antiquity of Śaivism. Here we also produce a photograph from a modern Śaivite temple, showing the *liṅga*-cum-*yoni*, over which is placed



Fig. 22. Kalibangan: Terracotta *liṅga*-cum-*yoni*. Mature Harappan.



Fig. 23. Śiva *liṅga* and *yoni* in a modern temple. From the overhead pitcher water-drops keep on dripping on the *liṅga*.

on a tripod a pot from the pierced bottom of which water keeps on dripping on the *liṅga*-cum-*yoni* (Fig. 23). On a terracotta tablet, found at Harappa, is depicted a person piercing a buffalo with a harpoon-ended long rod, evidently as a sacrificial offering to the Śiva-like deity seated on the right (Fig. 24). The practice of sacrificing a buffalo before Śiva is still prevalent in parts of Himachal Pradesh.

Yogic *āsana*s which, of late, have become a craze not only in India but across the world, go back to the Harappan times. Fig. 25 shows various poses of the *āsana*s, portrayed through Harappan terracottas. And capping it all, there is the famous limestone figure of a 'priest' in *dhyāna-mudrā* (meditative pose; Fig. 26).

And finally there is a terracotta from Harappa (Fig. 27) bidding you and me *namaste* in the typical Indian style!

From what has been stated in the preceding pages, the following facts emerge:



Fig. 24. Harappa: Terracotta tablet, depicting the Śiva-like seated figure (right) and a person attempting to kill a buffalo, perhaps as a sacrifice. Mature Harappan.

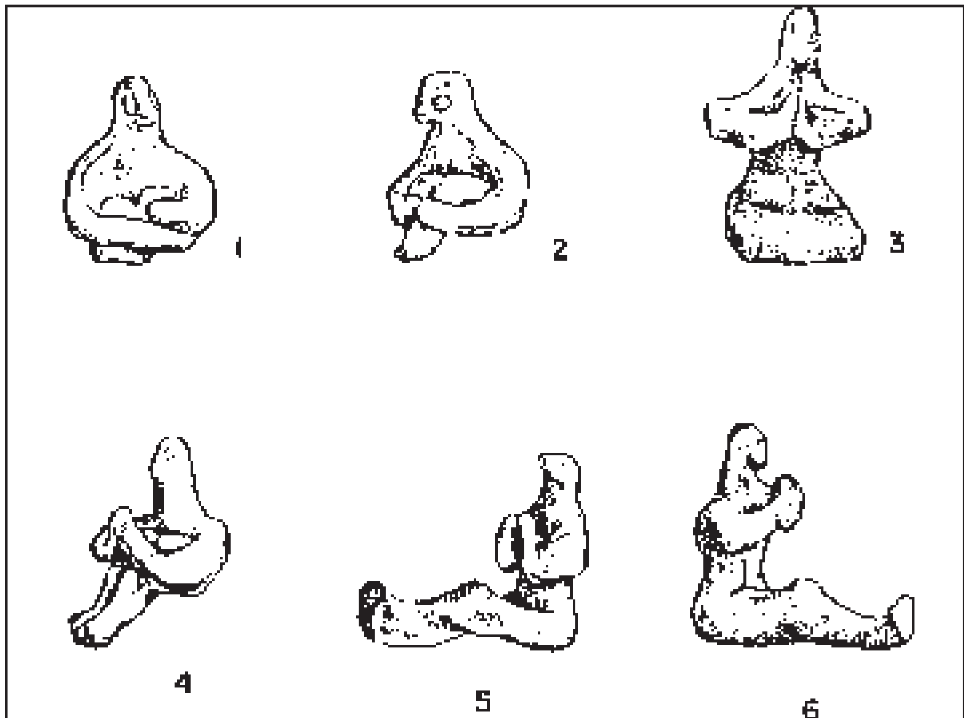


Fig. 25. Terracotta figurines in Yogic *āsana*s: 1-4, from Harappa; 5-6, from Mohenjo-daro. Mature Harappan.

1. The Sarasvatī of the *Ṛigveda* is not the Helmand of Afghanistan, but the present-day Sarasvatī-Ghaggar combine in India.
2. In its basin there flourished a mighty civilization called variously the Harappan, Indus or Indus-Sarasvatī Civilization.
3. In the Sarasvatī basin its roots go back to the 5th millennium BCE (radiocarbon dates from Bhirrana), if not earlier. This clearly shows that **the Indus-Sarasvatī Civilization was indigenous**.
4. Hydrological-cum-archaeological-cum-radiocarbon-dating evidence shows that the Sarasvatī dried up around 2000 BCE.
5. Since during the Ṛigvedic times the Sarasvatī was a mighty flowing river, **the *Ṛigveda* must be dated prior to 2000 BCE.** How much earlier – 500 years, 1000 years or more – it is anybody's guess.
6. According to *RV* 10.75.5-6, the Vedic Aryans occupied the region between the upper reaches of the Gaṅgā-Yamunā on the east to the Indus on the west.
7. **Which archaeological culture flourished in this very region and during the Ṛigvedic times, i.e. prior to 2000 BCE? <u>The only answer is: the Indus-Sarasvatī Civilization.</u>**



Fig. 26. Mohenjo-daro: Limestone statue of a 'priest'. The introvert eyes are indicative of *dhyāna-mudrā* (meditative pose). Mature Harappan.

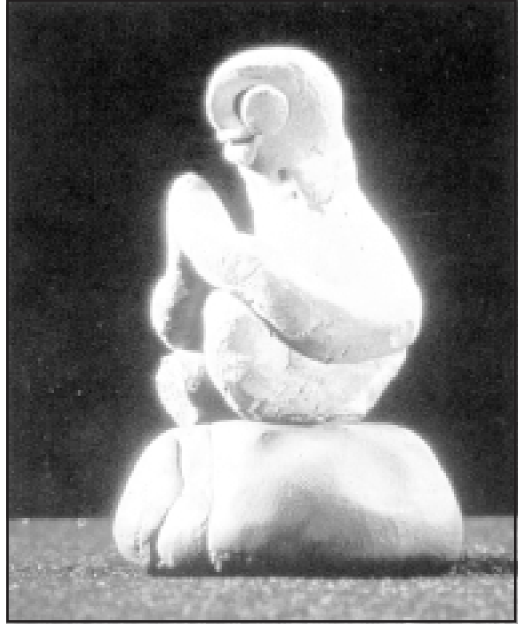


Fig. 27. Harappa: A terracotta figuirne greeting with *namaste*. Mature Harappan.

8. **Thus, the Indus-Sarasvatī Civilization and the *Veda*s are <u>two faces of the same coin.</u>**
9. **Since, as seen from No. 3 (above), the Indus-Sarasvatī Civilization was indigenous, it becomes self-evident that <u>the Vedic Aryans were indigenous</u>. This lays at rest the view that they were 'invaders' or even 'immigrants'.**
10. As seen from a number of illustrated examples, **this civilization did not die out, but is <u>still living in Indian culture and psyche.</u>**

At the end, I must say it was a great pleasure delivering this Address. I hope you were not bored. Many thanks for lending me a patient hearing.

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9

Where Lived the Ṛgvedic Ṛishis, Rulers, and Artisans, the Founders of Bhāratīya Sanskṛiti?

Shivaji Singh

INTRODUCTORY

Along the banks of the Sarasvatī and the adjoining river basins, collectively designated as *Sapta Sindhavaḥ* (*Ṛgveda* 8.24.27), lived our enlightened ancestors who developed a unique world-view blending materialism with spirituality that helped survive Bhāratīya culture against all odds during its long existence of over seven millennia. But, so far we do not know exactly on which sites of the area our Ṛgvedic ancestors lived. We cannot pin-point the settlements of the Bhāratas after whom our country is called Bhārata. This is rather a pity. A Greek proudly tells us: "Look, this is Mycenae where lived Agamemnon, the hero of the Trojan War." But as yet we cannot point out and say: "This is the place where dwelt Sudās, the hero of the Battle of Ten Kings (Dāśa-rājña)." We have no idea about the locations of the famous *Pañcha-janāḥ*, namely, the Pūrus, Anus, Druhyus, Yadus and Turvaśas who lived in the Sarasvatī Valley before moving on to different places in various directions. We do not know the location where the eminent philosopher Dīrghatamas sat down to delineate *Sṛishṭi-Vidyā*, the knowledge of cosmos and its creation. We cannot say where dwelt the great artisans who fashioned the chariots, weapons, boats and utensils mentioned in the *Ṛgveda*. We have no definite information about the places where dwelt the great Ṛishi families known as Viśvāmitras, Vasishṭhas, Agastyas, Kaṇvas, Aṅgirases and the like who are credited to have intuitively grasped the wisdom contained in the hymns of the *Ṛgveda*.

Fortunately, this pitiable state of ignorance is now going to end. Reappearance of river Sarasvatī has provided us a great opportunity and proper historical perspective. It is now the time to launch a major research project for identifying the sites associated with prominent Ṛgvedic ṛishis, kings and artisans, the founders of our culture and civilization. As I have shown elsewhere (Singh, 2004: 63-65), it is not difficult to identify archaeologically at least the main settlements of Ṛgvedic persons and peoples. We need only a few more excavations and a little more critical study of the text to do that. With *Ṛgveda* in one hand and spade in the other, it is possible to locate at least some of these valuable sites. If Heinrich Schliemann could discover the ruins of Troy, Mycenae and Tiryns, etc. with clues provided in the verses of Homer in nineteenth century when archaeological techniques were primitive, why can't we discover settlements of Ṛgvedic *janas* on the basis of valuable hints about them provided by the *Ṛgveda* today when archaeological techniques have become extremely refined?

Needless to say that such an enterprise would be extremely rewarding. For, when found, these sites may be developed as *Sānskṛitika Tīrthas* (places of cultural pilgrimage) that will not only help enrich the historical consciousness so necessary for national solidarity but also prove extremely fruitful for the development of our tourist industry.

In fact, reappearance of river Sarasvatī has ushered in a new era of research in the field of Indian history, archaeology and culture. The colonial paradigm of Indian history based on Indo-European linguistics is breathing its last. So also is the case of the Marxist paradigm of Indian history since the doctrine of dialectic materialism, that the Marxists preach, is inherently unsuited for historical interpretations in a country like India where spiritualism constitutes the core of accepted value system. The new paradigm emerging in the wake of Sarasvatī's discovery – call it Sārasvata paradigm – is characterized by a fresh scientific temper in which conclusions pertaining to the roots of Indian culture, arrived at mainly by literary-archaeological correlations, are being subjected to verification in the light of latest knowledge in earth sciences and biological sciences, on the one hand, and Indian ethos and psyche, on the other.

When a new era of research begins with a changed perspective, no one knows the limits of the horizon that would be illuminated in due course slowly and gradually or even suddenly. A few basic points, however, are already clear. First, the authors of the Vedic culture, the Āryas (not to be confused with so-called Aryans), were sons of the soil, not aliens. Second, the Vedic and Harappan cultures represent a single cultural tradition. In fact, what we call the 'Harappan' or 'Indus-Sarasvati' Civilization is a phase

(marked by the rise, intensification and collapse of an urban process) within the much earlier, more extensive and more durable Vedic Civilization that still continues.

The present paper has two sections: retrospect and prospects. In prospects, which is the main thrust of the paper, an effort is made to give a glimpse of the new and fascinating dimensions of research that the reappearance of this once the mightiest river of South Asia has opened before the historians. They pertain mainly to a correlation of the enormous mass of Vedic literary data with equally abundant Harappan archaeological findings. Special attention in this connection is paid to working out a methodology and procedure for identifying archaeologically the ancient settlements associated with eminent Vedic personalities in Sarasvatī Valley and the adjacent areas. In retrospect, which constitutes a sort of backdrop, historical studies about river Sarasvatī and the facts that have already been made clear by these studies are summarized for making the present discourse meaningful to a larger audience.

I
RETROSPECT

RIVER SARASVATĪ AS DEPICTED IN THE *ṚGVEDA*

To start with, let us first very briefly present the description of the river Sarasvatī as found in the *Ṛgveda*. In the Ṛgvedic times, it was a mighty river flowing from the mountains to the sea (*giribhyaḥ āsamudrāt*, *RV*, 7.95.2). The abundance and tremendous force of its waters had an enchanting impact on the minds of the poets who repeatedly described it as:

- 'abounding in waters' (*maho-arṇaḥ*, *RV*, 1.3.12),
- 'flowing rapidly' (*pra-sasre*, *RV*, 7.95.1; according to Sāyaṇa, *pradhāvati śīghram gachchhati*),
- 'moving faultlessly' (*akavārī*, *RV*, 7.96.3; Sāyaṇa's rendering: *akutsitagamanā*),
- 'possessing unlimited strength' (*yasyāḥ amaḥ ananto*, *RV*, 6.61.8; in the words of Sāyaṇa, *yasyāḥ balam aparyanto-aparimitaḥ*),
- 'the most impetuous of all other streams' (*apasām-apastamā*, *RV*. 6.61.13; Sāyaṇa renders this epithet as *vegavatīnām nadīnām madhye vegavattamā*),
- 'roaring' (*charati roruvat*, *RV*, 6.61.8; *bhṛiśam śabdam kurvan vartate*, according to Sāyaṇa), and even as
- 'fierce' (*ghorā*, *RV*, 6.61.7; Sāyaṇa's interpretation: *śatrūṇām bhayakāriṇī*).

The material and spiritual benefits the river Sarasvatī brought to the people is reflected in several epithets attributed to her as, for example:

- 'rich in grains' (*vājinīvatī*, *RV*, 7.96.3; Sāyaṇa renders the term as *annavatī*),
- 'giver of a lot of wealth' (*bhūreḥ rāyaḥ chetantī*, *RV*, 7.95.2; *bahulasya dhanāni prayachchhantī*, according to Sāyaṇa),
- 'strong in wealth and power' (*vājeshu vājini*, *RV*, 6.61.6)
- 'having golden path' (*hiraṇyavartaniḥ*, *RV*, 6.61.7),
- 'promoter of the welfare of the five peoples' (*pañchajātā vardhayantī*, *RV*, 6.61.12),
- 'the dearest among the dear ones' (*priyā priyāsu*, *RV*, 6.61.10),
- 'marked out for majesty among the mighty ones' (*mahimnā mahinā*, *RV*, 6.61.13),
- 'the purest of all rivers' (*nadīnām śuchiryatī*, *RV*, 7.95.2),
- 'purifier' (*pāvakā*, *RV*, 1.3.10; *śodhayitrī*, as explained by Sāyaṇa),
- 'auspicious' (*bhdrā*, *RV*, 7.96.3),
- 'inspirer of those who delight in truth' (*sunṛitānām chodayitrī*, *RV*, 1.3.11),
- 'the instructor of the right minded' (*sumatīnām chetantī*, *RV*, 1.3.11), etc.

The *Ṛgveda* provides us also an idea of the kind of people (good as well as bad in the eyes of the Rishis) settled in the Sarasvatī Valley and the neighbouring regions as, for instance:

- Pūrus, who, according to the text, dwelt 'in fullness of their strength', on both the grassy banks of Sarasvatī (*RV*, 7.96.2),
- Bharatas, whose king Vadhryaśva is said to have begotten Divodāsa by Sarasvatī's grace (*RV*, 6.61.1), and whose princes are found performing *yajñas* on the banks of Sarasvatī, Dṛishadvatī and Āpayā (*RV*, 3.23.4),
- Pañcha-janāḥ (the Five Peoples), that is, Anus, Druhyus, Yadus, Turvaśas and Pūrus, whose welfare the Sarasvatī had increased (*RV*, 6.61.12),
- Nāhushas, descendents of Nahusha, on whom the Sarasvatī had poured her benefits (*RV*, 7.95.2),
- Paṇis, the 'churlish niggard, thinking only of themselves' whom the Sarasvatī consumed (*RV*, 6.61.1),
- Pārāvatas, who were destroyed by the Sarasvatī (*RV*, 6.61.2), and
- Bṛisayas, whom the Sarasvatī rooted out (*RV*, 6.61.3).

Thus, we have a realistic picture in the *Ṛgveda* of a mighty and highly glorified river named Sarasvatī descending from the Hamalayas, flowing majestically and emptying into the sea, with names of the people living on its banks and in its valley. The fact that the river was later lost in the sands of the desert at a place called Vinaśana (literally 'disappearance') is also attested to by the literature (*Pañchvimśa Brāhmaṇa*, 25.10.6; *Jaiminīya Upanishad Brāhmaṇa*, 4.26, etc.). There is absolutely no ambiguity in descriptions, no room for any controversy, yet an effort was made to hijack the river out of India.

EFFORTS TO HIJACK THE SARASVATĪ AWAY TO AFGHANISTAN THAT FAILED

In order to force fit the literary descriptions of river Sarasvatī in the so-called Aryan invasion model, certain scholars have gone to the extent of locating it in Afghanistan. The sixth *maṇḍala* of the *Ṛgveda* is admittedly the earliest *maṇḍala* of the text. Taking advantage of this fact, Alfred Hillebrandt (a professor of Sanskrit in 1880s at the University of Breslau, Germany, who later held the position of Vice-Chancellor of that university twice) distinguished two Ṛgvedic Sarasvatīs, western and eastern. According to him, the scene of action in the sixth *maṇḍala* of the *Ṛgveda* is the Arachosia region in Afghanistan and the Sarasvatī depicted in that *maṇḍala* is river Arghandab flowing there (Hillebrandt, 1891/1999: 2.209-12). It was, this western Sarasvatī, the Arghandab, in his opinion, that had blessed Vadhryaśva with a son named Divodāsa. He locates the Paṇis, Pārāvatas and Bṛisayas, mentioned in the sixth *maṇḍala*, in and around Arachosia identifying them with Parnians of Strabo, Paroyetai of Ptolemy, and Barsaentes of Arrian, respectively. However, as it was next to impossible for him to locate the Bharata princes performing *yajñas* on the banks of Sarasvatī, Dṛishadvatī and Āpayā, associated together, he admitted that the Sarasvatī of the seventh and all other *maṇḍalas* of the *Ṛgveda*, except the sixth, was the eastern Sarasvatī that flowed through Kurukshetra.

Alfred Hillebrandt may be overlooked for he was writing all this over a century ago when Aryan Invasion Theory was accepted as a Gospel Truth and when Sarasvatī had not been rediscovered. On the same grounds, similar other speculations like that of Brunnhofer who identified Sarasvatī with Oxus or, for that matter, those of Roth and Zimmer who thought that Sarasvatī could be Indus and no other river, may be disregarded. These speculations were never taken seriously, and Macdonnel and Keith, the authors of the *Vedic Index*, had rejected them as early as in 1912. Even before them, Max Muller, who was no friend of Indian nationalists, maintained

that though lost in the desert, the modern Sarasutī was in the Vedic period a large river which reached the sea either independently or after joining the Indus. In view of such a background, it certainly surprises one to find that scholars like Irfan Habib and R.S. Sharma still argue that Sarasvatī of the earlier portions of the *Ṛgveda* existed in Afghanistan, not in India!

In their paper entitled 'The Historical Geography of India 1800-800 BC', presented to the 52nd Session of Indian History Congress held in 1992, Irfan Habib and Faiz Habib opine that the name Sarasvatī in the *Ṛgveda* stands for three different rivers. They designate them as Sarasvati-1, Sarasvati-2, and Sarasvati-3. According to the Habibs, Sarasvati-1 is the Avestan Harakhvaiti or Harahvaiti, 'the river which gave its name to the 10th land created by Ahur Mazda', the region later known to the Achaemenians as Harakhuvatish and to the Greeks as Arachosia. The Habibs recognize Sarasvati-2 as the Indus itself and assign all descriptions of a mighty Sarasvatī in the text to this river. Sarasvati-3, according to them, is the Sarasvati of the 75th hymn of the tenth book of the *Ṛgveda* (the famous *Nadī Sūkta*) in which 'Sarasvati appears among the tributaries of the Sindhu'. It is Sarasvati-3, they conclude, which is 'the sacred Sarasvati of the later Vedic and post-Vedic literature' and which is shown as Sarasvati-Ghaggar-Hakra in the Survey of India maps.

Thus, Irfan Habib and Faiz Habib revive more than a century old discarded theories of Hillebrandt, Roth and Zimmer at a stretch. However, unlike Hillebrandt, who identified Sarasvatī with Arghandab, the Habibs equate it with the Helmand 'above its junction with Arghandab' because the latter has 'much smaller volume of water' to match with Sarasvatī when referred together with big rivers like Sarayu and Sindhu as in *Ṛgveda*, 10.64.9. However, the equation of Sarasvatī with Helmand is simply out of question. As I have already discussed elsewhere (Singh, 1997-98: 140), Helmand is Avestan Haetumant, the river that gave its name to the 11th land created by Ahur Mazda (*Vendidad*, 1.14). Had the Avestan Haetumant been known to the *Ṛgveda*, it must have been known as 'Setumant', not as 'Sarasvatī'.

In fact, the Habibs have done away with this problem just in three paragraphs, covering less than a page of their paper. They have not even referred to the objections, not to speak of countering them, that had led to the rejection of the theories propounded long ago by Hillebrandt, Roth and Zimmer, which they seek to revive. Such is the casual manner of their hypothesizing three Sarasvatīs. Nevertheless, a senior leftist intellectual like R.S. Sharma takes this placing of the so-called 'earliest' Sarasvatī in Afghanistan as a proven fact. On page 35 of his book *Advent of the Aryans in India*, published in 1999, he states: "The earliest Sarasvati is considered

identical with the Helmand in Afghanistan which is called Harakhvaiti in the Avesta." Need we remind him that Helmand is called Haetumant, not Harakhvaiti in the Avesta?

NO MORE SPECULATION: RIVER SARASVATĪ IS NOW THERE BEFORE OUR EYES

Thanks to the cumulative efforts of hydrologists, geologists, field archaeologists and space scientists, the entire course of Ṛgvedic Sarasvatī marked by dry beds of its old channels from Adi Badri in Haryana to the Rann of Kachchh in Gujarat has now been clearly charted out (Sharma, Gupta and Bhadra, 2005-06). The story of the river's rediscovery goes back to the year 1844 when Major F. Makenson, while surveying the area from Delhi to Sindh for a safe route, came across a dry river-bed that was wide enough, as he said, for construction of an eight-way lane. A quarter of a century later, in 1869, archaeologist Alex Rogue was baffled to find Himalayan alluvial deposits in the Gulf of Khambat since the rivers Sabarmati, Narmada, etc., falling in the gulf could not have accumulated them as they were not Himalayan in their origin. He, therefore, felt that these deposits must have been brought there by the river Sarasvatī before its drying up. Another quarter of a century had not elapsed when in 1893 C.F. Oldham of the Geological Survey of India affirmed that the dry river-bed skirting the Rajasthan desert was definitely that of the Vedic Sarasvatī.

These early glimpses of Sarasvatī had alerted the archaeologists who started recognizing and reporting the presence of dry beds of the river from various segments of its possible course in Rajasthan and western India. Significantly, at several places Late Harappan settlements were found on the dry bed itself indicating thereby that the river must have dried up much before the time of those early settlers. Then, a major step forward in Sarasvatī's search was taken in 1970s-1980s when Landsat imageries provided by NASA (National Aeronautics and Space Administration) and Indian satellites enabled scientists like Yashpal and Baldev Sahai to chart palaeo-chanells of Ghaggar-Hakra and its tributaries that fitted perfectly well with the Ṛgvedic descriptions of Sarasvatī. As critically brought out in a paper (Yashpal *et al.* 1984), several points were quite clear by that time. First, the river had 'a constant width of about 6 to 8 km from Shatrana in Punjab to Marot in Pakistan'. Second, a tributary (Channel Y1) joined it southeast of Markanda. Third, another tributary (Channel Y2) that corresponds with present Chautang (ancient Dṛishadvatī) joined it near Suratgarh. Fourth, it flowed into the Rann of Kachchh without joining the Indus. Fifth, Sutlej was its main tributary, which later shifted westward,

probably due to tectonic activity. Sixth, Yamunā changed its course at least thrice before joining the Gaṅgā. In 1985, V.S. Wakankar set out with his team of scientists on his month-long Sarasvatī expedition. The expedition was extremely fruitful. It brought to light several significant facts about ancient settlements on the river and physically confirmed, on ground, the realities which the space scientists were pointing to by analyses of Landsat imageries.

During the last two decades that have passed since then, researches on Sarasvatī have vigorously continued throwing much fresh light on the river and its history. In a well-researched and thoroughly documented paper, geologists V.M.K. Puri and B.C. Verma (1998) have shown that Vedic Sarasvatī originated from a group of glaciers in Tons fifth order basin at Naitwar in Garhwal Himālaya. The river flowed for some distance in the mountains and receiving nourishment from Algar, Yamunā and Giri 'followed a westerly and southwesterly course along Bata Valley and entered plains at Adi Badri'. This proves that the Ṛgvedic description of the Sarasvatī as 'flowing from the mountains' was a ground reality, not a figment of poetical imagination. In that very paper, Puri and Verma have discussed at length the various developments responsible for the river's desiccation. According to them, reactivation of Yamunā tear, constriction of Vedic Sarasvatī's catchment area by 94.05%, emergence and migration of river Dṛishadvatī towards southeast acquiring the present day Yamunā course and finally shifting of Śutudrī (Sutlej) forced the Vedic Sarasvatī 'to change drastically from the grandeur of a mighty and a very large river to a mere seasonal stream' (Puri and Verma 1998: 19).

We now know also when the Sarasvatī dried up, thanks to the cumulative efforts of scholars like B.B. Lal, Robert Raikes and others. B.B. Lal's excavations at Kalibangan, the famous Harappan site situated on the left bank of Sarasvatī in Rajasthan, revealed that its occupants had suddenly abandoned the settlement 'even though it was still in a mature stage and not decaying'. After a thorough study of available evidence, Raikes concluded that it was abandoned because of scarcity of water in the river (Raikes, 1968). The radiocarbon dates placed this abandonment in around 2000 BCE (Lal, 1997: 245-46). Thus, it became clear that Sarasvatī had almost completely dried up by that time. This is an extremely significant information for the chronology of the *Ṛgveda*. Since the *Ṛgveda* was composed when the Sarasvatī was flowing in its full majesty, it cannot be assigned to a period later than 2000 BCE.

Many more scholars have contributed to Sarasvatī studies. The list is long but we may mention a few names. K.S. Valdiya, Fellow of the

Jawaharlal Nehru Institute of Advanced Studies and Research, Jakkur, Bangalore, has come out with his book *Sarasvati: The River That Disappeared*, published by the Universities Press in 2002. It is a valuable source of information on physical presence of Sarasvatī on ground. The life history of this 'mighty, snow-fed river that flowed from the foothills of the Himalyas to the shores of the Arabian Sea' has been discussed within the framework of geological parameters and the inferences rigorously evaluated on the anvil of geodynamics.

Significant are also the contributions of S.M. Rao, a nuclear scientist at Bhabha Atomic Research Centre. He was examining samples of water collected from deep wells in Pokharan area of Rajasthan to check whether any radioactive elements were present therein due to the nuclear tests. To his great and pleasant surprise, he found that the samples were of Himalayan glacial water 8000 to 14000 years old. This brought to his mind the Vedic Sarasvatī and he carried on further investigations on this topic. Later on, he came up with the results of his investigations in a paper entitled 'Use of isotopes in search of Last River' that appeared in the *Journal of Radioanalytical and Nuclear Chemistry*, in 2003. In this paper he has shown that 'the fresh groundwater in that region was indeed ancient and slowly moving southwest and probably had headwater connection in the lower ranges of Himalayas, but not to any glacier.' It was also noticed that 'the isotope data (^{2}H, ^{18}O, ^{3}H and ^{14}C) compared well with the data in a similar study on another branch of the buried channel in the Cholistan part of the Thar Desert in Pakistan'.

Worthnoting is also an authoritative anthology entitled *Vedic Sarasvati: Evolutionary History of a Lost River in Northwest India* edited by B.P. Radhakrishna and S.S. Merh that contains several important papers of scholars like Baldev Sahai, A.S. Rajawat and others. However, the most copious and covering almost all aspects of Sarasvatī studies are, to my knowledge, the contributions of S. Kalyanaraman, Director, Sarasvatī Nadī Śodha Prakalpa, Chennai. Kalyanaraman has devoted his life to Sarasvatī studies. In fact, his love and devotion for Sarasvatī Civilization is so compelling that he took voluntary retirement from his lucrative post of a Senior Executive of the Asian Development Bank, Manila, Philippines, so that he could single-mindedly work on the civilization as a full-time researcher. He has contributed a large number of research papers and published several books including the encyclopaedic *Sarasvatī* in seven volumes. Besides establishing the reality of Sarasvatī's existence, his researches have opened up a new dimension in unraveling what he rightly calls the *Sarasvatī* hieroglyphs.

In view of the enormous literary, archaeological and scientific data and evidence referred to above, it is clear that there is only one Ṛgvedic Sarasvatī, not two or three as imagined by some, and that the river survives as the Ghaggar-Hakra-Sarasvatī of the Survey of India maps. Though dried up on the surface, it is still flowing underneath. Currently the Haryana State Government is planning to revive it to meet the water requirements of the state both for drinking as well as irrigation purposes. Perhaps the day is not far off when Sarasvatī would be found flowing again from Haryana to Gujarat. Only those who have blindfolded themselves under a spell of bigotry can deny these facts.

FACTS ALREADY MADE CLEAR AS A RESULT OF VEDIC RIVER SARASVATĪ'S DISCOVERY

As noted earlier, among the facts that have already been made clear as a sequel to Sarasvatī's reappearance, two are the most important ones: First, the authors of the Vedic culture, the Āryas, are sons of the soil, not aliens. Second, the Vedic and Harappan cultures represent a single cultural tradition.

There are no takers of the Aryan Invasion Theory (AIT) today. Even its erstwhile upholders accept this fact now. The various incarnations and reincarnations of the AIT, the so-called Aryan Migration Theories (AMTs), have failed to arouse any confidence since they are contradicted by archaeological and genetic findings. A new theory called the Out of Bharat Theory (OBT) is gaining currency among scholars (Elst, 1999: 333-34; Talageri, 1993 and 2000; Singh, 2003 and 2004) that explains the linguistic affinities in phonology, vocabulary and grammatical structure, found in the so-called Indo-European languages, and accounts for those socio-religious and mythological parities that are observed in the traditions of the speakers of these languages. Even the very validity of 'language family' concept is being challenged now (Kak, 1994).

The other significant fact that the Vedic Harappan cultures represent a single cultural tradition is demonstrated by the geographical, chronological and cultural parities found between the Ṛgvedic culture and the Early-to-Mature Harappan culture (Singh, 2003). As the hymns of the Ṛgveda must have been composed at an advanced stage of what we call the Ṛgvedic culture, its initial phases must be correlated to pre-Harappan Hakra Ware culture (Kunal I, Bhirrana IA, etc.). The uniformity in Mature Harappan traits, particularly the signs and symbols, over a large area demonstrate a kind of 'oneness', an evidence of the emergence of a sort of social identity fostered by an expanding ideology. The question naturally arises: what else

this ideology was if not the Vedic? In literature we find the optimistic and martial Ṛgvedic Āryas waging wars against their enemies and moving from the banks of the Sarasvatī towards Indus and beyond. In archaeology we see the Mature Harappans overrunning different peoples and burning down settlements at Kot Diji in the Indus Valley and at Nausharo, Gumla and Rana Ghundai west of the Indus (Lal, 1997: 91). Is this correspondence in literary and archaeological scenarios insignificant? In fact, the Vedic-Harappan identity is proved not only by geographical, chronological and cultural parities between the two but also by the interdependence and similar developmental pattern of the ideological and urban processes that they represent (Singh, 2003).

II
PROSPECTS

Now that the Vedic-Harappan identity is beyond any doubt, we have before us the tremendous and fascinating task of correlating enormous literary and archaeological data with each other and presenting a wholesome history of the foundational period of Indian culture.

So far, several scholars have been providing evidence of horse bones and chariots in Harappan archaeological assemblages, and many others vehemently denying them. This is no literary-archaeological correlation worth the name. Tagging Vedic Āryas or even the so-called Aryans (that is, the Vedic-speakers) with horse is unjustified. There were several Anārya social groups in antiquity who were using horses and chariots. For instance, the Hyskos were not Vedic-speakers (nor were they speaking any branch of the so-called Indo-European language), but they are said to have conquered Egypt in the sixteenth century BCE with the help of horses and chariots. Should we consider the non-Āryas like Dāsas, Dasyus and Paṇis to have been stupid enough not to learn the use of horses and chariots from their adversaries, the Āryas, with whom they were living in close proximity?

In fact, with the discovery of river Sarasvatī literary-archaeological correlations have acquired a new, unlimited and hitherto unimagined scope. There are several dimensions of such correlations. One may, for instance, collect information about stone industry in the Vedic literature to later investigate the extent to which it matches with stone industry as known from Harappan archaeological assemblages. Or, one may, as I had done long ago (Singh, 1969), show the striking resemblance that exists between Vedic pottery, on the one hand, and Harappan and post-Harappan potteries, on the other. All such researches would indeed be important, but, to my mind, the most significant work would be to give meaning to Harappan signs and symbols in the light of Vedic literature. The other extremely

important research area is to locate archaeologically the settlements associated with eminent Vedic personalities and various social groups known to Vedic literature. This is a big task and may need several decades to complete it. In this paper, we shall confine ourselves to *Ṛgveda* and Early-to-Mature Harappan archaeology and try to outline a research strategy to locate the settlements of the eminent *janas* and personalities of that time.

THE QUESTION OF METHODOLOGY AND PROCEDURE: HOW TO GO AHEAD WITH THE TASK OF LOCATING ṚGVEDIC *SĀNSKṚITIKA TĪRTHAS*?

The proper method of carrying on this task should be, I think, to carry on the investigations into the following three successive steps:

The first step should be to prepare two separate maps showing ethno-geographic configurations: one based on the information provided in the *Ṛgveda* and the other based on the Early-to-Mature Harappan archaeological data.

Studies based on a juxtaposition of these literary and archaeological maps would constitute the next step of our investigations. This would provide us valuable hints about locations of significant settlements in the form of one-to-one correspondence between the two maps.

The final step would be to concentrate on individual settlements and take help of other relevant data, textual, archaeological, geographical, etc., to verify (or falsify) the conclusions arrived at by a comparison of the literary and archaeological maps of ethno-geographic configurations.

ṚGVEDIC ETHNO-GEOGRAPHIC CONFIGURATIONS

The 'Five Peoples' called *Pañcha-janāḥ* (*RV*, 1.89.10; 3.37.9, etc.) are the most frequently mentioned social group in the *Ṛgveda*. They are designated also as *Pañcha-jātā* (*RV*, 6.61.12), *Pañcha-mānushāḥ* (*RV*, 8.9.2), *Pañcha-chārshaṇyaḥ* (*RV*, 5.86.2; 7.15.2; 9.101.9), *Pañcha-kṛishṭayaḥ* (*RV*, 2.2.10; 3.53.16; 4.38.10, etc.), and *Pañcha-kshit*ayaḥ (*RV*, 1.7.9; 1.176.3; 5.35.2; etc.). Some of these nomenclatures seem to refer to the developing stages of their social formation. Thus, while *chārshaṇyaḥ*, from root *'char'* (to move), may point to their predominantly food-gathering condition that requires a lot of mobility within a homeland, *kṛishṭayaḥ*, from root *'kṛish'* (to cultivate) may indicate their settled agricultural situation. Similarly, *kshit*ayaḥ, from root '*kshi*' (to possess, to have power over), may express their still more developed social status when these people had acquired political sense of lordship over the territory they occupied (for somewhat similar ideas, see Nandi, 1986-87: 156-57).

The names of the ethnic units constituting this group of five peoples is not explicitly stated in the *Ṛgveda* resulting in certain wild speculations by some ancient and medieval authorities (Cf. *Aitareya Brāhmaṇa*, 3.31; Yāska, *Nirukta*, 3.8; Sāyaṇa on *RV*, 1.7.9; etc.). However, on circumstantial evidence, modern scholars in general agree that the Anus, Druhyus, Pūrus, Yadus and Turvaśas are the Ṛgvedic 'Five Peoples'. They are clearly mentioned together in one verse (*RV*, 1.108.8) and substituting Yakshu for Yadu, in another hymn too (*RV*, 7.18). It is also clear that initially all these five peoples lived on the banks of the Sarasvatī (*RV*, 6.61.12) though later on in the Ṛgvedic period itself several of them moved to other areas (Singh, 1997-98: 33).

The Bharatas have received the maximum notice in the *Ṛgveda* though they are not included in the group of the 'Five Peoples' mentioned above. Though pitted against the 'Five Peoples', they were themselves a branch of the most important among them, the Pūrus. Their relationship with the Tṛitsus is not very certain. However, the data at hand suggests that Tṛitsus were the royal family of the Bharatas. The Kuśikas constituted another family of the Bharatas to which belonged Viśvāmitra, the former priest of the Bharata chief Sudās later replaced by Vasishṭha. The Bharatas are depicted as performing sacrifices on the banks of Sarasvatī, Āpayā and Dṛishadvatī (*RV*, 3.23.4) showing that they were living in the region between the rivers Sarasvatī and Yamunā, that is, in the Kurukshetra area.

Besides the above 'Five Peoples' and the Bharatas, there are at least thirty other ethnic units referred to in the *Ṛgveda*. We list below their names alphabetically giving one Ṛgvedic reference to each one of them though some occur in the text more than once:

1.	Aja (7.18.19)	2.	Alina (7.18.7)
3.	Bhalāna (7.18.7)	4.	Chedi (8.5.37-39)
5.	Gandhāri (1.126.7)	6.	Guṅgu (10.48.8)
7.	Ikshvāku (10.60.4)	8.	Kīkaṭa (3.53.14)
9.	Kṛitvan (9.65.23)	10.	Krivi (8.20.24)
11.	Kuru (8.3.21)	12.	Matsya (7.18.6)
13.	Maujavant (10.34.1)	14.	Nahusha (1.100.18)
15.	Naichaśākha (7.53.4)	16.	Paktha (7.18.7)
17.	Pārāvata (8.34.18)	18.	Parśu (7.83.1)
19.	Pārthava (8.83.1)	20.	Ruśama (8.3.13)
21.	Śigru (7.18.19)	22.	Śimyu (7.18.5)
23.	Śiva (7.18.7)	24.	Śṛiñjaya (4.15.4)
25.	Uśīnara (10.59.10)	26.	Vaikarṇa (7.18.11)
27.	Varaśikha (6.27.4-5)	28.	Vaśa (8.8.20)
29.	Vishāṇin (7.18.7)	30.	Vṛichīvant (7.27.7).

The settlements and movements of some of these ethnic units can be ascertained on the basis of the *Ṛgveda* and subsequent Vedic literature. Thus, it is known that the extreme northwest of the Ṛgvedic geographical horizon, which extended at least up to the river Kabul (Kubhā) in Afghanistan, was occupied by the Gandhāris, Pakthas, Alinas, Bhalānasas and the Vishāṇins. After their defeat in the 'Battle of Ten Kings', the Druhyus had also moved towards the northwest from the Sarasvatī Valley. Their presence in Gandhāra region is attested to by the later tradition (Macdonell and Keith, 1912/95: 1.385).

The Pūru leader Trasadasyu had acquired a new territory on the banks of the river Swat (Suvāstu) and he is described as ruling over there (*RV*, 8.19.37). This appears to be in addition to his original domain in the Sarasvatī Valley for he says that he has possession over two territories (*Mama dvitā rāshṭram kshatriyasya*, *RV*, 4.42.1). In the Sindh and Punjab region were located the settlements of the Śivas, Parśus and Vṛichīvants. The Pūrus and the Bharatas continued to occupy respectively the western and eastern parts of the Sarasvatī Valley down to the end of the Ṛgvedic period. The Śṛiñjayas too were located somewhere nearby the territory of the Bharatas. They were closely allied with the latter for Bharata chief Divodāsa and a Śṛiñjaya leader are celebrated together (Macdonell and Keith, 1912/95: 2.469) and the Turvaśas are depicted as common enemies of both (*RV*, 6.27.7; 7.18).

During the Ṛgvedic period, the Yadus seem to have migrated from the Sarasvatī region towards south and southwest finally reaching the Gujarat and Kathiawar area where, according to Epic-Puranic tradition, many of their lineages flourished. In their journey towards Gujarat, they had to cross through large water-logged tracts in which Indra is said to have helped them (*RV*, 6.20.12). That, they became large cattle-owners and wealthy, is also attested to by the text (*RV*, 8.1.31; 6.46).

To the south of the Punjab, in the region of Rajasthan and Malwa, were located the settlements of the Matsyas and Chedis. In the eastern part of the Ṛgvedic geographical horizon on the banks of Yamunā lived the Ajas, Śigrus and Yakshus who sacrificed heads of horses to Indra when the Bharata chief Sudās defeated Bheda (*RV*, 7.18.19). Another social group, called the Pārāvatas, also lived on the Yamunā as later attested to by the *Pañchavimśa Brāhmaṇa* (9.4, 11). Their location on the northern border of Gedrosia, earlier proposed by Hillebrandt, is not accepted by vedicists and as the authors of the *Vedic Index* rightly opine, the mention of Sarasvatī River in connection with the Pārāvataa in the *Ṛgveda* accords with their position on the Yamunā (Macdonell and Keith, 1912/95: 1.518-19).

The easternmost ethnic unit known to the *Ṛgveda* is that of the Kīkaṭas. They are said to be living in the Magadha area (Talageri, 2000: 119). The *Ṛgveda* does not provide sufficient information about the location of several social groups mentioned by it. However, these too may be roughly located keeping in view the core areas of the composition of the books (*maṇḍalas*) of the text in which they occur. As I have shown elsewhere (Singh, 1997-98), most of the hymns contained in the sixth and seventh books of the *Ṛgveda* were composed in the Sarasvatī Valley and the majority of hymns in the latter half of the first and fourth books in the lower Indus region, the area today known as Sindh. This line of investigation may fruitfully be developed further and where no other clue to locate an ethnic unit is available, the core area of the book in which it occurs may be taken to represent its most probable habitat.

THE EARLY-TO-MATURE HARAPPAN AND THE IMMEDIATELY PRECEDING AND CONTEMPORARY ETHNO-GEOGRAPHIC CONFIGURATIONS

While the various Ṛgvedic communities are known by their names mentioned in the text and we have no difficulty in distinguishing them, the social groups in relevant archaeological cultures have to be identified by a critical study of inter-assemblage variability. This is because none of the Early-to-Mature Harappan and the immediately preceding and contemporary cultures relate to a single ethnic unit or community. Formation of each one of them involves several social groups.

Archaeologists now agree that the Harappan archaeological assemblages in various areas are not alike and despite certain uniformities in the urban phase, they have significant regional variations. Gregory L. Possehl (1982/93: 19-26) has distinguished as many as six Harappan 'domains'. They are: (1) Eastern or Haryana (Kalibangan) Domain, (2) Northern or Punjab (Harappa) Domain, (3) Central or Bahawalpur (Ganweriwala) Domain, (4) Southern or Sindh (Mohenjo-daro) Domain, (5) Western or Gedrosia (Kulli/Harappan) Domain, and (6) Southeastern or Gujarat (Lothal) Domain. It is also realized that there lived several ethnic units in each domain. The Eastern or Haryana Domain, for instance, has a distinct Bara culture on the Sutlej (Sharma, 1982/93: 141-65) and another equally distinct Siswal culture on the Chautang, the dry bed of the Dṛishadvatī (Bhan, 1971-72: 44-46).

Then, it is also a fact that the Harappans, though the most dominant social group of the Sarasvatī-Sindhu region, were neither omnipotent nor the only participants in the cultural formation of the time and area. In fact,

they were interacting with several non-Harappan peoples in various areas. Jim G. Shaffer and Diane A. Lichtenstein (1995:137) have already shown that the Mature Harappans were, or had the potential to be, interacting with a variety of culturally similar or different peoples in various regions such as with agricultural and pastoral groups like the Kulli or Damba Sadaat on their borders in Baluchistan, with Kot Dijians, Mehrgarh VI-VII people and perhaps Amrian social groups on the Indus plain, with cattle pastoralists of Bagor in Rajasthan, with agriculturalists engaged in significant metallurgical activities of the Ganeshwar and Banas groups in the same region, with hunters and gatherers of Langhnaj in Gujarat, and perhaps with Vindhya rice horticulturists in the Gangetic plain. Several other social groups like the Neolithic people of Kashmir and rice cultivators of mid-Ganga plain may be added to the list of ethno-geographic configurations given by Shaffer and Lichtenstein with whom the Harappans may have been associated. The Sarasvatī-Sindhu (Harappa) civilization emerged and flourished because of the close symbiotic ties maintained between the Harappans and many of these social groups living in and around the different Harappan domains.

With this background we may, now, proceed with the considerations of ethno-geographic configurations in the following three major areas:

1. In the Sarasvatī Valley

The earliest archaeologically identified culture of the Sarasvatī Valley is the Hakra Ware culture which goes back to the beginning of the fifth millennium BCE as evidenced by recent Carbon-14 dates of samples from Bhirrana (a site in Fatehabad district of Haryana) determined by the Radiocarbon Laboratory of the Birbal Sahni Institute of Palaeobotany, Lucknow (Sample No. BS 2314, calibrated date 4353 BCE and Sample No. BS 2318, calibrated date 4721 BCE).

Long ago, in the Pakistani part of the Sarasvatī Valley, M. Rafique Mughal (1982/93: 85-95) had identified 99 sites of this culture in the Cholistan area comprising the Bahawalnagar and Bahawalpur districts. The antiquities collected from the surface of the sites, mostly single culture ones, clearly indicated that the authors of this culture were at a level of social formation which was more advanced than the Neolithic stage but had still not fully acquired a Bronze Age status. The excavated sites of the culture in Indian part of the valley have made the picture still clearer. The Hakra culture people were using a varied range of pottery mostly made on slow wheel but occasionally also by hand (Rao *et al.* 2004-05 and 2005-06). Some of the pottery features, especially the tradition of coating the exterior with mud intermixed with small bits of pottery and quartz granules, link the

culture with Amri IA levels in Sindh dated to the early part of the fourth millennium BCE showing a westward diffusion of the culture.

Its cultural continuity in the following Sothi/Kot Diji/Kalibangan I phase is evidenced both in and outside the Sarasvatī Valley at sites including Sarai Khola, Jalilpur and Ghaligai (Shaffer, 1992: 445). Hakra elements have been noticed at Burzahom in Kashmir too where, as in the Swat Valley, they seem to have persisted into the mid-second millennium BCE. Probably there were other social groups in the Sarasvatī Valley existing along with the Hakra Ware people, but at present our knowledge about them is very imperfect. Possibility of the presence of a non-Hakra group in the earliest levels at Kunal in Haryana datable to about 3100 BCE has been expressed (Gupta, 1996: 52-53; Khatri and Acharya, 1994-95: 84-86).

During what is presently called the Early Harappan Period, several social groups were living in the Sarasvatī Valley. They are represented by archaeological assemblages found at a large number of sites. In the Cholistan region Mughal (1982/93:91) had recorded 40 sites of this period as against 99 of the earlier Hakra Ware stage. But, compared to Hakra Ware culture sites, the Early Harappan settlements are much larger in area and have thicker deposits indicating growth in population as well as increase in sedentary habits. In the Indian part of the Sarasvatī Valley, over two decades ago 137 sites of this period were recorded by J.P. Joshi, Madhu Bala and Jassu Ram (1984). The number of known Early Harappan sites have greatly increased since then.

Several of these sites on the Indian side like Kalibangan, Banawali, Rakhigarhi, Kunal and Bhirrana have been subjected to excavation to various extents. The findings show that despite new developments and changes, these assemblages clearly manifest a cultural continuity demonstrating membership to a tradition not only by inheriting certain features (like the continuance of some ceramic styles) from the earlier Hakra Ware phase but also by introducing significant new elements (such as the peacock and *peepal*-leaf designs on pottery, terracotta 'cakes', the bricks with sides in the ratio of 4:2:1, etc.) to the succeeding Mature Harappan phase. The homogeneity of the assemblages is emphasized by several features, especially the use of black and white colours in painting the potteries (outlines in black and fillings in white generally). This is considered to be a distinctive feature of the Early Harappan pottery not only in the Sarasvatī Valley but also outside it (Lal, 2002: 30).

However, it must be noted that despite the obvious homogeneity in Early Harappan assemblages, there are regional variations. For instance, certain features characterize only particular sites or have restricted distribution. Thus, a dull chocolate coloured burnished ware with 'parin'

marks is found only at Kunal (Khatri and Acharya, 1994-95: 84) and features like fortification and pit-dwellings are present at some sites while absent on others. Not much work has been done on the inter-assemblage variability demonstrated by the sites of the period. Nevertheless, the differences in assemblages are clear enough indicating the presence of several distinct ethnic units in different localities of the Sarasvatī Valley before the emergence of urbanization or what is known as the Mature Harappan phase. In fact, their individuality was not completely lost even during the peak period of urbanization which must have considerably intensified their interaction.

Earlier it was believed that the transition from the rural to urban phase of the Harappan culture occurred somewhat quickly. Gregory L. Possehl (1990) had suggested a duration of 150 years for the transition and Shaffer and Lichtenstein (1989) were inclined for a still lesser time of only 100 years (around 2600-2500 BCE) for it. However, after considering comparatively more recent data from Dholavira, Kot Diji, Kunal and Harappa, S.P. Gupta (1996: 68-100) assigned it a duration of 'at least 200 years if not more' placing it roughly between 2800 BCE and 2600 BCE. It was, thus, a gradual and not an abrupt transition.

A noteworthy fact about this transition is that its core area was the Sarasvatī Valley. The earliest set of Mature Harappan dates around 2600 BCE are from Kalibangan, a site on the Sarasvatī (Lal, 1997: 246; Table 2). Then the Harappan sites in the Sarasvatī Valley outnumber those in the Indus Valley by more than six times (Gupta, 1996: 3). These facts speak for themselves. Though trade, commerce and industry, the basic factors leading to any urban process, involve areas far separated from each other, the human initiative invariably comes from certain specific quarters. It can hardly be doubted that in case of the Harappan urbanization the initiative was provided by the leading social groups living in the Sarasvatī Valley. Shaffer and Lichtenstein (1989: 123) are of the view that the palaeoethnic group called the Harappan that dominates the Integration Era (that is, the urban phase) of the 'Indus-Sarasvati tradition' was created by a fusion of Hakra, Kot Diji and Bagor ethnic groups in the Sarasvatī Valley. One may or may not agree with the inclusion of Bagor group in this fusion, but the fact remains that its locale was the Sarasvatī Valley. In fact, as I have discussed in detail elsewhere (Singh, 2003: 26-28), the Vedic ideology that arose in the Sarasvatī Valley, played a significant role in the rise and intensification of the Harappan urbanization.

In the Sarsvatī Valley, the concentration of the Harappan sites is noticed in three distinct localities. Joshi, Bala and Ram (1984: 513-16) designate them as 'economic pockets' meaning thereby clusters of closely-knit inter-

dependent sites developed in the process of achieving subsistence self-sufficiency. The first cluster of sites is located roughly in the area extending from Kalibangan (in District Hanumangarh, Rajasthan) in the southwest to Balu (in District Jind, Haryana) in the northeast and includes the sites of the Mansa taluk of District Bhatinda in Punjab. Moving downstream along the Sarasvatī, the second cluster of sites is found in the Cholistan and the third further downstream in Kutch. It is worthnoting that though Cholistan has the heaviest site concentration, it has only one big site Ganweriwala, which measures 81.5 ha. in area, all others falling in size categories that range from less than 5 ha. to not more than 20 ha. (Chakrabarti, 1995: 31). The concentration of sites in Kutch, where Sarasvatī joins the Arabian Sea, is rather surprising in view of the area's minimal agricultural potentiality. Evidence at hand shows that animal breeding must have been the main cause for the concentration of sites in this area.

It may be pointed out that the factors leading to the formation of three distinct localities of site clusterization in the Sarasvatī Valley, the concentration of the largest sites in Mansa taluk of Bhatinda in Punjab, the emphasis on animal husbandry in Kutch, etc. are directly linked to changing ethnogeography of the valley. In absence of a detailed analysis of inter-assemblage variability based on specific trait distributions, these facts alone provide us a peep into the palaeoethnicity of the area watered by Sarasvatī and its tributaries.

2. In the lower Indus Valley

In the Early Harappan times, the lower Indus Valley was occupied by several different social groups like the Amrians, Balakotians and others. The Amrians derive their name from a site named Amri in western Sindh where their cultural remains were clearly defined by J.M. Casal in the early nineteen sixties. The presence of Amrians has been noted also at Ghazi Shah and several other sites throughout western Sindh and Baluchistan. Agriculture, pastoralism and fishing were three main patterns of their subsistence (Fairservis, 1975: 208-16). Their cultural traits leave no room for doubt that they constituted a distinct social group, but they were not living in isolation. Their participation in an interaction system is attested to by the presence of a few Hakran and Kot Dijian types of pottery at Amri, the finding of some Amri-style pottery at Balakot and similarities in shapes, decorative motifs and abstract signs in the potteries of Amri, Balakot and Kot Diji assemblages (Shaffer, 1992: 445). The chronological horizon of the Amri culture is placed roughly between 3500 and 2600 BCE.

The Balakotians constitute another distinct pre-Harappan community in the lower Indus Valley. They are known from Balakot, a coastal site in

District Las Bela, located in Khurkera alluvial plain some 88 km north-west of Karachi. They had affinities with social groups occupying upland areas in the north. This is indicated by the presence of specimens of a polychrome pottery called the Nal Ware (well-known from the type-site Nal in District Jhalawan) and the Togau-style decorative motifs on pottery (a feature of Kalat-Anjira area) in the earliest levels of Balakot. Some pottery types from later levels of Amri too appear in earlier levels at Balakot and increase subsequently showing a developing interaction between the Balakotians and Amrians. It is interesting to find that the Balakotians were using mud bricks for constructing their houses that have side measurements in the same ratio of 4:2:1 that was soon to become typical to Mature Harappans. The Balakotians were present on the site throughout the fourth millennium BCE and for a century or so even in the third.

Moving up the Indus Valley north and northeast from Balakot and Amri, one reaches two well-known sites, Mohenjo-daro and Kot Diji, situated at a distance of about 43 km from each other, the former on the right bank of the Indus and the latter on the left bank of that river though a little away from it. At both these sites lived pre-Mature Harappan communities. The data from Mohenjo-daro is scanty (as it has always been difficult to recover it due to rise in underground-water level) but unmistakable. The materials recovered in borings show that pre-Mature Harappans at Mohenjo-daro were using a sort of 'Wet Ware' similar to that found at Jalilpur (Lal, 1997: 62-63).

However, as if to compensate for the scarcity of evidence at Mohenjo-daro, Kot Diji has presented a very rich data in this connection. The excavations at the site have brought to light from its earliest levels an important social group of the pre-Mature Harappan horizon designated after the name of the site as Kot Dijians. Their pottery, mostly wheel-turned is quite distinctive (Khan, 1965). The most significant pottery-type is a globular pot with a thin body, slightly everted rim and fugitive broad band painted round the neck. On one of such pots, a horned deity is painted in black and white on a dark brown glassy slip. This may have been an earlier depiction of the well-known horned deity (or deities) of the Mature Harappan times. The uppermost Kot Dijian layer is sealed by a thick deposit of burnt and charred material. The subsequent layers after a break pertain to Mature Harappans. The chronological horizon of the Kot Dijians spans roughly from 3000 to 2500 BCE.

The nuclear area of the Kot Dijians, it must be noted, is in the Sarasvatī Valley where it is found on at least 177 sites (40 in the Pakistani and 137 in the Indian part of the valley, Lal, 2002: 48). They were the most expansionist social group of their time. In the process of colonization, the Kot Dijians

sometimes founded new settlements becoming their original settlers (as at Harappa), but more often they overtook previously settled habitations from others. Outside the Sarasvatī Valley, their presence is attested to at several sites like Harappa and Jalilpur on the Ravi, at Gumla and Rehman Dheri in Gomal basin and at Sarai Khola in Taxila area (Gandhāra) besides of course at Kot Diji on the Indus.

3. Outside the Sarasvatī and the lower Indus valleys

Archaeology reveals the presence of several distinct social groups in areas outside the Sarasvatī and the lower Indus valleys that fall in the Ṛgvedic horizon. We have referred to the occupation of Gumla by the Kot Dijians. But, before the Kot Dijians reached there two separate social groups had already lived at the site (Dani, 1971-72). The first to settle on the site were a pottery-less people, using a variety of microliths, who were advancing towards what the archaeologists call the Aceramic Neolithic stage. The next to occupy the site were a pottery-using community who had, as indicated by their pottery-traits, affinities with social groups living in Northern Baluchistan and in areas further west and north-west.

Similarly, Jalilpur was already inhabited by a distinct social group characterized by a hand-made, thick and under-fired red pottery coated by a mixture of clay and pottery-bits before the Kot Dijians joined them at the site and soon overwhelmed them. So is the case of Rehman Dheri. Here lived a people who used a fine red pottery with paintings in black and chocolate. Further north from the Gomal Valley, in the Bannu basin too there lived several ethnic units whom we meet in the course of Kot Dijian colonization. The data at hand suggests that besides founding some new settlements in the area (like Tarakai Qila), the Kot Dijians had overtaken several others (like Sheri Khan Tarakai) from earlier occupants.

The Kot Dijians extended their colonization up to Gandhāra region (that is, up to Rawalpindi and Peshawar districts in Pakistan). At Sarai Khola (a site of the region in the vicinity of Taxila) the earliest settlers were a Neolithic people. They have produced a distinctive brown coloured pottery that is wheel-turned and highly burnished. These Neolithic people, resembling their contemporaries at Burzahom, were present at this site when the Kot Dijians arrived there and overtook the site from them.

We need to identify the various palaeoethnic units of Baluchistan and Southern Afghanistan too because the Ṛgvedic 'contact area' extended to these regions. Jim G. Shaffer (1992) has identified at least nine and four different social groups in what he designates the Baluchistan and Helmand traditions respectively. He calls these social groups 'phases' but, for

convenience, we name them simply as 'peoples'. The Mehrgarh people (included in Indus Tradition too) constitute the earliest and the most important social group in the Baluchistan Tradition. The others are the Kile Ghul Mohammad people, Kechi Beg people, Damb Sadaat people, Nal people, Kulli people, Perano people, Bampur people and the Pirak people. In the Helmand Tradition, he counts the Mundigak people, Bampur people, Helmand people, Shahr-I-Sokhta people and the Seistan people. Shaffer has ascertained their chronological spans and contextual position on the sites they have occupied.

Coming back home, a word on the social groups of the pre-Mature Harappan horizon in Gujarat. Valuable evidence in this regard is provided by excavations at Dholavira. R.S. Bisht (1991) has distinguished the lowest 60-70 cm deposit at the site as pre-Mature Harappan. Though somewhat disputed (Chakrabarti, 1995: 41), other archaeologists give due credence to this evidence. In this context, B.B. Lal refers also to the presence of 'un-Harappan' micaceous wares in the lowest deposits in Lothal region reported by S.R. Rao, the discovery of some pottery at Nagwada in the Rupen estuary that have affinities with Amri pottery of Sindh, and to the pre-Mature Harappan radio-carbon dates made available for 'pre-Prabhas Culture' at Prabhas Patan (Somnath) as also for early deposits at Rojdi in Central Saurashtra and Padri in District Bhavnagar (Lal, 1997: 84-85). That, several pre-Mature Harappan communities were present in different areas of Gujarat too, is beyond doubt.

LOOKING FOR ONE-TO-ONE CORRESPONDENCE BETWEEN THE ṚGVEDIC AND EARLY-TO-MATURE HARAPPAN ETHNO-GEOGRAPHIC CONFIGURATIONS

The literary and archaeological pictures of ethnogeographic configurations that we have outlined above are indeed sketchy needing much more elaboration by further research. Nevertheless, juxtaposing the two pictures and searching one-to-one correspondence between them, it is possible to answer several questions of the type posed in the beginning of this paper. For want of space, we shall consider here, as example, only the following three questions:

1. Where lived Sudās, the hero of the 'Battle of Ten Kings'?

Sudās, the victor of *Dāśarājña*, as is well-known, was an illustrious scion of the Bharat family. Fortunately, the *Ṛgveda* provides clinching pieces of information to locate the Bharatas geographically. As already stated, they are depicted as performing *yajñas* on the banks of Sarasvatī, Dṛishadvatī

and Āpayā (*RV*, 3.23.4), which means that they occupied the region watered by these rivers. Dṛishadvatī is identified with Chautang. Originating in the Siwalik Range, it flowed via Jagadhari, Nilokheri, Jind, Hissar, Nohar and Suratgarh and joined the Sarasvatī near the well-known archaeological site Kalibangan (Sahai, 1976: 37). Āpayā was located between the Sarasvatī and Dṛishadvatī and flowed past Thanesar (Pusalker, 1951: 242). It is Āpagā of the *Mahābhārata* (3.83.68) described as a famous river of Kurukshetra, the area between the rivers Sarasvatī and Dṛishadvatī. The geographical location of the Bharatas given in the *Ṛgveda*, thus, makes it evident that they lived in what is know in archaeology as the Eastern Harappan domain (Possehl, 1982/83: 20), that is, the Haryana domain of Harappan culture.

Then, there is a clinching evidence to infer that out of all the sites in this domain, it is Kalibangan that must be taken to be the capital of the Bharatas. As I have shown elsewhere (Singh, 2004: 63-64), the *Ṛgveda* depicts the Bharata chiefs as the greatest performers of Vedic sacrifices. In fact, in the entire text there are only a few persons, perhaps not more than five, who are credited to have lent their names to Agni Devatā which shows their outstanding devotion to, and enthusiasm for, sacrificial ritual. It is worth noting that four of these five special personalities belong to the Bharata family, the fifth and the only one non-Bharata being Trasadasyu of the Pūru line (*RV*, 8.19.32). Agni is repeatedly called 'Bhārata', meaning 'of Bharata' or 'belonging to the progenitor of the Bharatas (*RV*, 2.7.1 & 5; 4.25.4; 7.8.4). Other chiefs of the Bharata clan whose Agni has been distinguished are: Vadhryaśva (*RV*, 10.694 &101), Divodāsa (*RV*, 8.103.2) and Devavāta (*RV*, 3.23.3).

Now, looking for an indication of this special fervour for *yajñas* in archaeological assemblages, attention naturally turns to Kalibangan where excavations have brought to light elaborate arrangements for performing public as well as household sacrifices (Lal, 1997: 123-24 & 227-28). Many houses in the Lower Town at Kalibangan have separate rooms reserved for sacrificial ritual. In the Citadel Area, atop a platform, as many as seven *yajña-kuṇḍas* (fire-altars) are found arranged in a row touching a wall oriented northsouth, so that persons performing *yajña* could do so only facing the east. Nearby, there was a well meant in all probability for ritual bathing. In another area to the northeast of the Lower Town, called KLB-3, a group of fire-altars have been discovered within a mud-brick enclosure. Evidence even of animal sacrifice has been found at the site. Although fire-altars have been found at a few other sites of the period in and outside the Sarasvatī Valley, there is nothing comparable to what has been met with at Kalibangan. Where else can the Bharatas, the greatest performers of *yajñas*,

be located if not at Kalibangan? At least, until future investigations bring to light some other site in the Haryana Harappan domain producing richer evidence of sacrificial activities, the claim of Kalibangan as the seat of the Bharatan authority will have to be maintained.

2. Where are the ancient settlements on which resided the Pūrus?

Coming now to the Pūrus, who also lived in the Sarasvatī Valley along with the Bharatas, we find a significant piece of information in the *Ṛgveda* to isolate their location from that of the Bharatas. The text (*RV*, 7.76.2) informs us that 'in the fullness of their strength' the Pūrus dwelt on both the banks of the Sarasvatī. Thus, unlike the Bharatas who lived on the left (eastern) bank of the Sarasvatī in what was later to be called Kurukshetra, the Pūrus occupied both the banks of Sarasvatī. Now, anyone conversant with the distribution of Early and Mature Harappan sites in the Sarasvatī Valley would immediately recognize the Central (that is, the Bahawalpur) Harappan domain to be the domain of the Pūrus wherein sites are almost equally distributed on both the banks of the river (Joshi *et al.* 1984: Map on page 517; Possehl, 1982/93: Map on page 21; Lal, 1997: Map on page 33 & 103).

There is yet another consideration that supports this inference. The Harappan 'domains' distinguished by settlement archaeologists are basically manifestations of power-weilding elite groups. Although several social groups occupied the Sarasvatī Valley, the Bharatas and Pūrus were undoubtedly the two most dominant groups in the valley (Singh, 1997-98). Hence, if literary data lead us to assign the Bharatas to the Haryana domain, it is only reasonable that we relate the other powerful group, the Pūrus, who were closely connected with the Bharatas, to the Bahawalpur domain. It is most probable, then, that Gamanwala, the largest Early Harappan site in this domain, was the capital of the Pūrus.

As noted by M.R. Mughal, a striking feature of the Mature Harappan period in Cholistan is 'a general shift of sites from northeast to south-west around and beyond Derawar Fort' (Mughal, 1982/93: 92). This shift of sites in the Cholistan area may have been partly caused by a thrust of the Bharatas on the Pūrus who were their adversaries. Under such a circumstance, it is very likely that in the Mature Harappan times, the Pūrus might have shifted their centre of authority from Gamanwala to Ganweriwala. At present, pending thorough excavation work on these Pakistani sites, this seems to be the most reasonable inference.

The illustrious Pūru chief Trasadasyu is known to have carved out a new territory for the Pūrus. At a place in the *Ṛgveda* (8.19.37), we find him

ruling on the banks of Suvāstu (Swat). As stated earlier, this must have been in addition to his original domain in the Sarasvatī Valley for he says that he has authority over two territories (*RV*, 4.42.1). This new Pūru territory may also be identified archaeologically. In this context, attention may be drawn to the site named Sarai Khola situated close to Taxila in Gandhara area. The culture sequence at the site makes it clear that the earliest inhabitants at this place were a Neolithic folk using stone celts and flint blades besides a highly burnished brown pottery. These people witnessed the arrival of the Early Harappans on the site in Period II marked by a decrease in the brown burnished pottery and a simultaneous increase in Early Harappan pottery. The newcomers lived there for a considerable duration as indicated by the thickness of their cultural deposit at the site which is about 2.15 m. In the present stage of archaeological research, it is only this Early Harappan expansion in the Gandhara region that may be related to Trasadasyu's conquest and rule in that area.

3. Where initially dwelt the *Pañcha-janāḥ* before moving on to different locations?

The Pūrus, Anus, Druhyus, Yadus and Turvaśas, collectively known as the *Pañcha-janāḥ*, initially lived in the Sarasvatī Valley for, as noted earlier, Sarasvatī is said to have increased their welfare (*RV*, 6.61.12). The common designation *Pañcha-janāḥ* for these five Ṛgvedic families hints at their close connection with each other. In the *Purāṇas*, all of them are said to be the descendants of Yayāti (Pargiter, 1922/97: 88). In view of this strong historical tradition, it is very likely that initially all these people belonged to one and the same family which by a process of gradual segmentation became five.

Looking for the location of *Pañcha-janāḥ* in the Sarasvatī Valley at this early stage of their history, that is, before Anus and Druhyus moved on towards northwest and Yadus and Turvaśas towards southwest (Singh, 1997-98), our attention is drawn towards a concentration of Harappan sites in Mansa taluk of District Bhatinda in Punjab situated along the Sirhind rivulet, a tributary of the Sarasvatī. It is worth noting that five Harappan sites of the Mansa area exceed 100 hectares in size. The approximate measurements are: Lakhmirwala 225 ha., Dhalewan 150 ha., Gurni Kalan I – 144 Ha., and Hasanpur II and Baglian Da Theh each 100 Ha (Chakrabarti, 1995: 89). These settlement sizes are indeed enormous for that early period. It may be noted that even on liberal assessments, Mohenjo-daro and Harappa are respectively only 200 ha. and 150 ha. in size (Chakrabarti, 1995: 61 & 83) and Dholavira about 100 Ha. (Bisht, 1991). Still more significant is the fact that these five big sites of Mansa taluk, along with twenty others of

much lesser dimensions in between them, are located comparatively in a very small area measuring 1250 sq. km. only. This is an unusual case of inter-space relationship since normally such large sites are found far separated from each other. It indicates that at a time five powerful elite groups were located close to each other in this part of the Sarasvatī Valley making it very likely that they were the settlements of the famous *Pañcha-janāḥ*.

CONCLUSION

Vedic river Sarasvati's reappearance is an epochal event of immense national importance from several angles. In the field of Indian historical studies, it has resulted in a complete paradigm change in which hitherto several long received views like the Vedic-Harappan dichotomy, the AIT, etc. have been proved to be totally false. It is now abundantly clear that the Vedic Āryas, the founders of Indian civilization, were sons of the soil, not invaders or migrants from outside. It is also beyond doubt that the Harappan culture, representing the rise, intensification and collapse of an urban process, is just a phase of the much earlier, more extensive and more durable Vedic culture that still continues.

With this major paradigm shift, the historian's responsibility has increased today as never before. He has to write afresh the entire history of the formative period of Indian culture. He has to redefine the personality of India that has been badly distorted by Colonial-Missionary and Marxist historians. He has before him the tremendous task of correlating huge Vedic literary data with equally abundant Sarasvatī-Sindhu archaeological findings. Above all, he has to identify and locate on terra firma the ancient settlements where lived the enlightened Ṛgvedic Rishis and other great personalities of the time, who wisely fashioned and firmly placed the *Amṛita-kalaśam* whose foliage and flowers are Indian civilization and culture. Such blessed settlements, when located, must be developed as *Sānskṛitika Tīrthas*. This is imperative for enhancing proper historical consciousness so necessary for national solidarity. On the entry gate of these *Tīrthas* should be engraved in bold letters for visitors from all over the world: "Here you are going to visit men who are supremely men."

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10

Sarasvati River and Chronology: Simulations using Planetarium Software

B.N. Narahari Achar

I. INTRODUCTION

The theme of the conference is the Vedic River Sarasvati and Hindu Civilization. One aspect of the study in understanding the role of the great river is to develop some chronological markers. The Mahābhārata war was fought on the banks of this river[1] and the pilgrimage of Balarāma at the time of the war on the banks of the river Sarasvati provide some historical elements needed. References to astronomical events in the epic *Mahābhārata* have been recognized as observed and not computed. These astronomical events can be simulated using planetarium software and thus provide a basis for dating these astronomical events. The dating of the events in the Mahābhārata war correlates well with the dating of the archaeological explorations along the river. The paper presents the results of an ongoing research over the past few years regarding the date of the Mahābhārata war. The progress of the research has been reported in several publications, including monographs. The present article is based on three stages of development represented in these publications.[2]

Correlation can also be made with dating of astronomical events described in other Vedic texts such as *Saṁhitā* and *Brāhmaṇa* texts. Astronomy is considered to be the foremost of sciences, and has played an important role in India since the Vedic times. Astronomy was essential in determining the proper times for performing the ritual *yajña*. It is generally accepted that the *Ṛgjyotiṣa* (*RJ*) recension of *Vedāṅgajyotiṣa* (*VJ*) is the earliest codified text of astronomy of India. This paper also addresses the state of

astronomy in India from the earliest times to *Vedāṅgajyotiṣa*. The accounts of history of astronomy in ancient India that are currently available[3] have to be modified in view of the developments discussed below.

II. VEDĀṄGAJYOTIṢA

It is universally accepted that *RJ* is the earliest text of astronomy in ancient India. The knowledge codified in this text is attributed to sage Lagadha, but the composition of the text which has preserved this knowledge is attributed to Śuci, a disciple of Lagadga. *RJ* is more like a pocket reference rather than a detailed treatise of astronomy and gives all the knowledge of astronomy essential for the performance of Vedic rituals, codified in a form akin to the style of *sūtras* in 36 *ślokas*, easy for memorization, but sometimes difficult for understanding. It is declared to be the science of time, as its primary purpose is to determine the proper time for the performance of Vedic rituals. Some of the important concepts of *RJ* include *tithi*, *nakṣatra* (defined as a division of the ecliptic), *aṁśā*, *kalā*, *aṣṭaka* and *parvan*. Units of time, and measurement of time, *ṛtu*, *ayana*, and *adhimāsa* and a five year period called *yuga*. Pingree,[4] in his eagerness to show that *VJ* was derived from Mesopotamian origin, assigned a date of ~ 400 BCE for it, while Sastry[5] and others had assigned a date of ~ 1200 BCE, based on the reference in *RJ* that the winter solstice occurred at Dhaniṣṭha, and on the identification of Dhaniṣṭha with β-Delphini. The author has argued[6] that every astronomical concept in *RJ* can be traced to *Ṛgveda* and other Vedic texts. For the concept of *tithi*, for example, there are several well known quotations from *Ṛgveda* which show that the year nominally of 360 days is divided into 12 months of 30 days each, thus alluding to tithi, the 30th part of a lunar month:

> dvādaśāraṁ na hi tajjarāya varvarti cakraṁ paridyāmṛtasya
> āputrā agne mithunāso atra saptaśatāni vimśatiśca tasthuḥ//
>
> (*RV* I.164.11

> The moon is the one who shapes the year: samānāṁ māsa ākṛtiḥ
>
> *RV* X. 85.5

Aitareya Brāhmaṇa (32.10) defines the *tithi* and the *Taittirīya Brāhmaṇa* gives the names of the fifteen *tithis* of the waxing phase:

> etānuvākau pūrvapakṣasyāhorātrāṇāṁ nāmadheyāni//
>
> *TB* 3.10.1.1-3

> and the names of the fifteen *tithis* of the waning phase:
> etānuvākā parapakṣasyāhorātrāṇāṁ nāmadheyāni//
>
> (*TB* 3.10.1.2)

The concepts of equinoxes and solstices, the scheme of *adhimāsa*, the five year *yuga* system can all be traced to Vedic sources.[7] For example, *Aitareya Brāhmaṇa* (18.22) shows the knowledge of the equinox and the period between two solstices:

yathā vai puruṣa evaṁ viṣuvāmstasya yathā
dakṣiṇo'rdha evaṁ pūrvo'rdho/
viṣuvatoyathottiro'rdha evamuttarā'rdho
viṣuvatastasmāduttara ityācakṣate

The practice of inserting an intercalary month is adduced to in
Veda māso dhṛtavato dvādaśa prajāvataḥ/ vedā ya upajāyate//
(*RV* I. 25.8

II. b. Nakṣatra system is already known in Ṛgveda

Nakṣatras, variously translated as asterisms or lunar mansions with an enduring list of 27 (sometimes 28) in number, have been the hallmark of Indian astronomy. They refer to stars, which lie near the path of the sun or the moon as markers, while in *RJ* they refer to the divisions of the ecliptic. Explicit mention of the names of only a few of the 27 *nakṣatras* is found in Ṛgveda although the complete list of 27 (or 28) *nakṣatras* can be found in other *Saṁhitā* and *Brāhmaṇa* texts. This has led scholars to believe that not all the *nakṣatras* were known at the time of Ṛgveda and the development of the full list occurred later. The author has shown that the entire list of *nakṣatras*[8] can be found in Ṛgveda, contrary to the scholarly pronouncements that such an entire list came to be recognized only at the time of *Taittirīya Saṁhitā*.

II. c. Names of the months caitra, etc. already known in Ṛgveda

One of the characteristic features of the Hindu calendar is the naming of the month on the basis of the *nakṣatra* near which a full moon may be taken to have occurred. These are the well known *caitra*, *vaiśākha*, *jyeṣṭha* etc. The names of the months in the Vedic texts, however, are *madhu*, *mādhava*, *śukra*, *śuci*, *nabhas*, *nabhasya*, *iṣa ūrjā*, *sahas*, *sahasya*, *tapas* and *tapasya*. Some scholars have conjectured that the names of the months based on the *nakṣatras* was not known during the *Saṁhitā* times, but came into vogue much later. In fact, Dikshit[9] surmises that this scheme came into vogue when the vernal equinox actually took place in *caitra*. Using the planetarium software, the author has shown that there is no basis for this argument to establish a chronology. The scheme of naming the months called the *caitrādi* system has also been traced[10] to *Ṛgveda* on the basis of the connection between *Yajña* and the important role of *Agni* in it.

III. TIME AND ITS MEASUREMENT

Astronomy is an observational science. *RJ* propounds a five year luni-solar year called the *yuga*, comprising of ten *ayanas*, subdivided into *ṛtu*, *māsa*, *ardhamāsa*, *ahorātra*, *kalā*, *muhūrta*, *kāṣṭā*. These concepts can be traced to Vedic sources, for instance, in *Mahānārāyaṇopaniṣat*,

kalāmuhūrtāḥ kāṣṭāścāhorātrāśca sarvaśaḥ/
ardhamāsā māsā ṛtavassaṁvatsaraśca kalpantāṁ// (*MNU* 1.2.3-4)

The method of measuring time with a water clock can be traced to *Atharvaveda,*[11] and the method of Gnomon can also be traced to Vedic sources. In short, the entire astronomical knowledge of *Vedāṅgajyotiṣa* is traceable to *Ṛgveda*. The related question of *kaliyuga*, *manvantara*, *kalpa,* etc. will be discussed in a separate paper.

IV. IDENTIFICATION OF THE VEDIC NAKṢATRAS

Although in *RJ* the *nakṣatras* refer to divisions of the ecliptic, and the names of the divisions correspond to bright asterisms also known by the same names, there must have been a time when only the asterisms and not the divisions of the ecliptic were used as the markers for the observation of movements of the sun and the moon. It is essential to identify the Vedic *nakṣatras* (the bright stars) with their modern names, for the lists that are available in the literature are not satisfactory, some of the asterisms being more than 30° away from the ecliptic and could not have been used as markers for the motion of the sun and the moon. The author has used the simulations using the planetarium software, SkyMap Pro, of nearly 900 new moons and full moons occurring around 2297 BCE, when *kṛttikās* (identified with Pleiades) were on the equator and around 2220 BCE, when the vernal equinox occurred at *kṛttikās* and has produced[12] a table for identification of the *nakṣatras*, which is reproduced below. This identification is based on the view of the sky as the Vedic people themselves would have seen as simulated by the planetarium software. On the new moon days and full moon days, there is absolutely no question about the relative positions of the sun and the moon, and hence of the *nakṣatra*, which describes the moon's position. The details of the identification procedure can be obtained from the reference cited above. The planetarium software produces the view of the sky by an extrapolation of the positions of the stars in a modern catalogue. The stars identified as a particular *nakṣatra* will therefore retain the identity. This is in contrast to the procedure adopted by Pingree,[13] where the polar coordinates of stars given in a *Siddhānta* text is first converted to

equatorial coordinates, then extrapolated to modern epochs to compare with the coordinates of stars in a modern catalogue and then make the identification.

The present list is believed to be the correct one as it is based on the view of the sky the Vedic people themselves would have observed. It agrees with most of the stars in the list given in the Report of the Calendar Reform Committee,[14] but there are six cases, where there is disagreement. The new identification is based on stars, which are very close to the ecliptic and hence better suited as markers for the motion of the sun and the moon. Besides, the new identification easily explains a controversy[15] that had plagued the *nakṣatra* system, namely, classification into *deva* and *yama nakṣatras*.

V. DATE OF VEDĀṄGAJYOTIṢA

The author has recently shown[16] that the date for the Lagadha recension of *Vedāṅgajyotiṣa* must be revised to about 1800 BCE, rather than the previously accepted date of 1200 BCE. The date of *Vedāṅgajyotiṣa*, as discussed by Sastry,[17] is based on the calculation of the time when winter solstice occurred at *Dhaniṣṭha*. The date of 1200 BCE is based on the identification of *Dhaniṣṭha* with β-Delphini according to the old identification scheme derived from the *yogatāras* of the *Siddhāntas*, and may not correspond to what the Vedic people themselves had observed. Based on the identification scheme

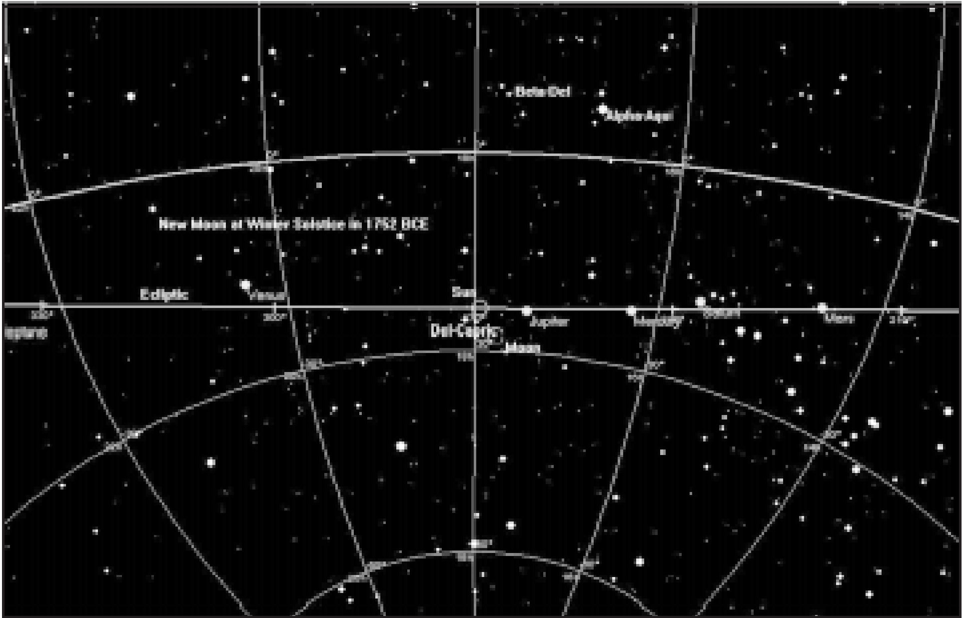


Fig. 1. Winter solstice in 1752 BCE.

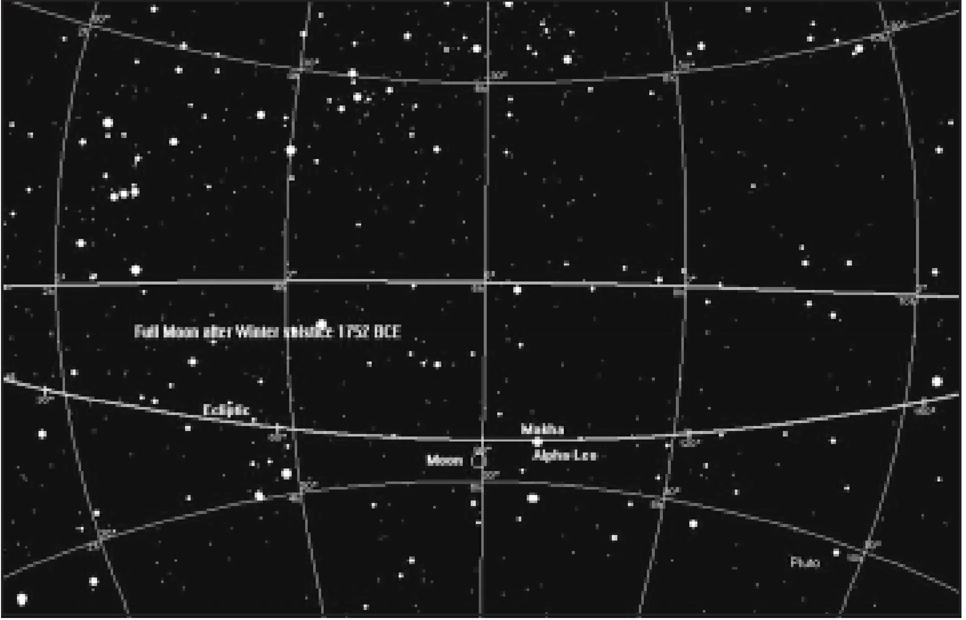


Fig. 2. Full Moon after the winter solstice in 1752 BCE.

proposed by the author in Table 1, *Dhaniṣṭha* corresponds to δ-Capricorni. Fig. 1 shows the star map for Delhi on January 3, 1752 BCE, the day of winter solstice. It is clearly seen to be the month of *māgha* in (Fig. 2) as per the description in *RJ* verses 5 and 6. It can be noted that β-Delphini is more than 30° away from the ecliptic and could not be a marker star, whereas δ-Capricorni is right close to the ecliptic and would be suitable as a marker star. Thus, it follows that the date of Lagadha recension of *Vedāṅgajyotiṣa* is to be dated around 1800 BCE. That there must have been versions of *Vedāṅgajyotiṣa* much older than the Lagadha recension, as for example that followed at the time of the Mahābhārata war.

Table 1: Identification of Vedic Nakṣatras+

Nakṣatras	*No. of stars*	*Identification of the Principal Star* RCRC	*Present*	*Presiding Deity*
kṛttika	6	*η-Tau*	*η-Tau*	*Agni*
rohiṇi	1	*α-Tau*	*α-Tau*	*Prajāpati*
mṛgaśira	3	*λ-Ori*	*β-Tau**	*Soma*
ārdrā	1	*α-Ori*	*γ-Gem**	*Rudra*
punarvasu	2	*β-Gem*	*β-Gem*	*Aditi*
puṣya	1	*δ-Cnc*	*δ-Cnc*	*Bṛhaspati*

āśleṣa	6	*ε-Hya*	*ζ-Hya*	*Sarpa*
makhā	6	*α-Leo*	*α-Leo*	*Pitṛ*
pūrvaphālguṇi	2	*δ-Leo*	*δ-Leo*	*Aryamā*
uttaraphālguṇi	2	*β-Leo*	*β-Leo*	*Bhaga*
hasta	5	*δ-Crv*	*γ-Vir**	*Savitā*
citrā	1	*α-Vir*	*α-Vir*	*Indra*
svāti	1	*α-Boo*	*π-Hya**	*Vāyu*
viśākha	2	*α-Lib*	α_2*-Lib*	*Indrāṇi*
anūrādhā	4	*δ-Sco*	*δ-Sco*	*Mitra*
jyeṣṭhā	1	*α-Sco*	*α-Sco*	*Indra*
mūla	7	*λ-Sco*	*λ-Sco*	*Pitṛ*
pūrvāṣāḍha	4	*δ-Sgr*	*δ-Sgr*	*Āpaḥ*
uttarāṣāḍha	4	*σ-Sgr*	*σ-Sgr*	*Viśvedevāḥ*
śravaṇa	3	*α-Aql*	*β-Cap**	*Viṣṇu*
dhaniṣṭha	5	*β-Del*	*δ-Cap**	*Vasu*
śatabhiṣa	1	*λ-Aqr*	*λ-Aqr*	*Indra*
pūrvābhādra	2	*α-Peg*	*α-Peg*	*Ajaekapāt*
uttarābhādra	2	*γ-Peg*	*γ-Peg*	*Ahirbudhnya*
revati	1	*ζ-Pis*	*ζ-Pis*	*Pūṣā*
aśini	2	*β-Ari*	*β-Ari*	*Aśvin bharaṇi*
3	*δ-Ari*	*δ-Ari*	*Yama*	

\+ List taken from Achar (2002b).

* These identifications differ from the usual list. These stars are brighter and closer to the ecliptic and are natural choice as markers of the motion of the sun and the moon.

VI. DATE OF ŚATAPATHA BRĀHMAṆA

It is a well known fact that there are many references to astronomical phenomena contained in the *Brāhmaṇa* texts and in fact these references have been used in the past by scholars such as Tilak[18] and Dikshit[19] to determine the dates of the events mentioned in these texts. A prime example of such investigations is the dating of the *Śatapatha Brāhaṇa* by Dikshit on the basis of the following lines referring to *kṛttikās*:

etā ha vai prācyai diśo na cyavante ... (*SB* II.1.2.3)

"and again they do not move away from the eastern quarter" (Tr. Eggeling[20])

amī hy uttarā hi saptarṣayaḥ udyanti purā etāḥ .... (*SB* II.1.2.4)

"these latter, the seven *ṛṣis* rise in the north and they (the *kṛttikās*) in the east" (Tr. Eggeling)

These lines occur in the second *Brāhmaṇa* of the first 'adhyāya' of the second 'kāṇḍa' of *SB*, in connection with choosing a suitable time for *agnyādhāna*, the establishment of the ritual fires for the first time by a householder. It is suggested that the new householder should establish the traditional *gārhapatya* and the *āhavaīya* fires on the day of *kṛttika nakṣatra*, for their presiding deity is *Agni*. The *kṛttikās* never swerve from the east and they alone consist of many stars. He who performs *agnyādhāna* on the day of *kṛttikā* is blessed with 'abundance' and a 'steadfast family'. But, the second line quoted above argues against this proposition; for, *Saptarṣis*, who were married to *kṛttikās* are constantly separated from the latter as they rise only in the east, while the *Saptarṣis* stay in the north, implying a similar fate befalling the new householder. However, counter arguments are presented and finally, it is argued that *kṛttikās* are the most auspicious, but some other *nakṣatras* are also suggested as equally auspicious for the purpose of *agnyādhāna*.

The astronomical importance of these lines was recognized by Dikshit, who interpreted "they do not move away from the eastern quarter" to mean that the '*kṛttikās* rise exactly at the east point' and used this fact to determine the date of *SB* as ~3000 BCE. With the advent of the so-called planetarium software, Achar[21] reinvestigated this particular issue by simulations of the view of the sky and confirmed that Dikshit was essentially correct in his dating of *SB*.

VII. DATE OF THE MAHĀBHĀRATA WAR

The importance of the date of the Mahābhārata war as the sheet-anchor[22] for the chronology of Bhārata is too well known to be stated again. According to tradition, the war between the Kauravas and Pandavas took place at the transition between *dwāpara* and *kaliyugas*,[23] around 3000 BCE. However, ever since Western scholars showed interest some hundred years ago in the epic and began to discuss its 'historicity', a lively debate (or rather a war of dates!) has been going on. While some scholars[24] declare that the whole epic is a myth denying any historical truth to the story of the epic, many do believe[25] that the war actually took place, but are divided as to the magnitude of the event and as to the date when it actually took place. Some scholars portray the epic as an exaggerated account of a family feud. A plethora of dates ranging from before 5000 BCE to around 1000 BCE have been proposed[26] on the basis of estimates arrived at by using diverse methodologies and there appears to be no consensus for the date.

Among the diverse methodologies used, one methodology that is of special interest here is the one based on astronomical references (of which

there are more than one hundred and fifty in number, and occur scattered throughout the epic). More than 40% of all the articles[27] (totalling more than 120 in number) dedicated to determining the date of the war, are based on the astronomical references. Although the astronomical references are scattered throughout the epic, most of them pertaining to the war occur in 'Udyogaparvan' and 'Bhishmaparvan' of the epic. Practically, all scholars have characterized the references in 'Bhishmaparvan' as astrological omens[28] and inconsistent and not suitable for a 'scientific' analysis. The earlier works using the astronomical references were tedious and calculations were done manually and hence chose to use only a couple of the astronomical events out of the many available in the epic. More recent studies have used the computer software 'planetarium software' and consequently have considered a much larger number sample of astronomical references in the epic. Still, until recently there appeared to be no convergence of the dates.[29] Some scholars have introduced[30] ad hoc hypotheses in attempting to find some degree of coherence among the apparently 'inconsistent' astronomical references. It is clearly shown that the astronomical references are quite consistent and that such ad hoc hypotheses are totally unnecessary. The present article summarizes the results of a research conducted by the author over the past five years using planetarium software and the results have been published in several research publications. The research has shown conclusively that

(i) the astronomical references in the *Bhishmaparvan* are not merely 'astrological effusions fit for mother goose's tales' (as once characterized by Professor Sengupta), but follow a Vedic tradition of omens and describe mostly comets and not planets as generally assumed,

(ii) the few true planetary references in this *parvan* are identical to those in *Udyogaparvan*,

(iii) these common references leads to a unique date for the war – 3067 BCE.

(iv) all other astronomical references in the epic are consistent with the date

(v) the date agrees with the date given earlier by Professor Raghavan and is consistent with the traditional date 3000 BCE.

(vi) using the planetarium software, it can be easily demonstrated that all other dates proposed by different authors are inconsistent with the planetary configurations referred to in (ii) above.

VII A. ASTRONOMICAL REFERENCES IN UDYOGAPARVAN

Kṛṣṇa's mission for peace is so important that astronomical events in reference to that mission are recorded.

(i) Kṛṣṇa leaves for Hastināpura in the *maitrī muhūrta* in the month of *Kārtika* on the day of *revatī nakṣatra*.

(ii) On the way he halts at a place called Vṛkasthala and reaches Hastināpura on the day of *bharaṇī nakṣatra*.

(iii) The meetings and discussions for peace go on till the day of *puṣya nakṣatra*, when Duryodhana rejects all offers of peace. War becomes imminent.

(iv) Kṛṣṇa leaves Hastināpura on the day of *Uttara phālgunī*. Karṇa accompanies him in his chariot and has a long conversation with him.

(v) During the conversation Karṇa describes some omens he has seen that indicate a great harm to the Kuru family which include the following: *śani* is afflicting *rohiṇī*, *aṅgāraka* has performed a retrograde motion before reaching *Jyeṣṭhā* and is prograde again having past anūrādhā, the moon had lost all its luster on the full moon of *kārtika* and a solar eclipse would appear to take place next new moon day.

(vi) At the end of the conversation, Kṛṣṇa sends a message to Bhīṣma and Droṇa through Karṇa that seven days from that day there is going to be an *amāvāsya* at *jyeṣtha* and that war rituals be started on that day.

Except for Professor Sengupta, these astronomical references are generally agreed to be genuine and pertinent by most scholars. Professor Sengupta does not have 'faith in the astrological omens' described by Karṇa in (v) above. However, he does believe that the reference to 'jyeṣṭha amāvāsya' is extremely important, but considers the reference to two eclipses occurring within thirteen days eclipses as interpolation.

VII B. ASTRONOMICAL REFERENCES IN BHĪṢMAPARVAN

Sage Vyāsa meets with Dhṛtarāṣtra just prior to the war and describes the omens he has seen. Among these omens described in 76 verses in two chapters are some 40 astronomical references given in four different segments. These are some of the most misunderstood astronomical references. On a superficial reading, and assuming that the astrological references to *graha* pertain to planets as most scholars have done, the references appear to be confusing and contradictory. Since they also occur in four different segments, scholars have characterized them as unreliable

and even as interpolations. But, by a careful analysis the author has shown that Vyāsa is very systematic in his description and follows a very genuine Vedic tradition of omens. The omens occur in four segments because they pertain to four different aspects of the impending disaster: (a) an imminent war, (b) great harm to the Kuru family, (c) destruction of both armies, and (d) disaster to the entire population. Most of the omens pertain to comets and not planets. The only true planetary positions are described in segment (b) as the omens describing harm to the Kuru family; they are identical to those described by Karṇa earlier in *Udyogaparvan*. This is easily demonstrated, for example, by comparing the first segment of astronomical references in *Bhīṣmaparvan*: Chapter 2, verses 20-23 with some selected *mantras* from *Atharvaveda Pariśiṣṭha*.

Table 2: Comparison with *Atharvaveda Pariśiṣṭha*.

References in (MB VI.2. 20-23) Vyāsa tells Dhṛtarāṣtra:	*'yuddhalakṣaṇa' in Atharvaveda Pariśiṣṭha*
"I observe the sun every day both at sunrise and sunset and have seen him as if encircled by long arms." "I see the sun surrounded by halos on all sides, halos which are tri-colored, dark in the middle and white and red towards the edge and accompanied by lightning." "I have been watching days and nights, the fierce sun, the moon and the stars shining incessantly and have been unable to distinguish between day and night. Surely this forebodes utter destruction." "On the full moon night of *kṛttika,* the moon with a fiery tinge was hardly visible, devoid of glory and the horizons were also of the same hue."	"(In predicting war) one should always consider the line of clouds and halos around the sun and the moon and observe whether they appear red in color or not."(64.5.7) "Which are blue and red towards the edges and dark in the middle and accompanied by lightning." (61.1.4) "Whenever the sun is surrounded at sunrise and sunset by tri-colored clouds, it indicates a great calamity to the earth and royal families." (61.1.15) "The color of the moon at the time of an eclipse indicates a battle if it is red and disaster to cities and villages if it smoky or fiery." (53.5.1-2)

It is clear that these are omens for an imminent war according to a Vedic tradition.

In the second segment, Vyāsa describes some omens, which forecast a great destruction, especially to the Kuru family:

rohiṇīṁ pīḍayanneṣa stitho rājan śanaiścaraḥ/
vyāvṛttaṁ lakṣma somasya bhaviṣyati mahadbhayaṁ//

(*MB* VI. 2. 32)

"Oh King, Saturn is harassing Aldebaran and the spot on the Moon has shifted from its position. Something terrible will happen."

abhīkṣṇaṁ kampate bhūmirarkaṁ rāhustathāgrasat/
śveto grahastathā citrāṁ samatikramya tiṣṭati//

(*MB* VI. 3. 11)

"The Earth is experiencing tremors intermittently and Rahu (Moon's node) has seized the Sun. Śvetagraha has transgressed Spica."

These are identical to the omens described by Karṇa to Kṛṣṇa in *Udyogaparvan*.

Vyāsa describes in the third segment further indicators, in the form of comets, of the calamity to the entire army (senayoraśivaṁ ghoraṁ ...). He names specifically a number of comets, *śveta*, *dhūmaketu*, *mahāgraha*, *paruṣa*, *pāvaka*, *dhūma*, *lohitāṅga*, *tīvra*, *pāvakaprabha*, *śyāma*, *ghora*, and *dhruvaketu*, as can be seen from the original Sanskrit verses. All these names can be found in the list of comets given by Varāhamihira.[31]

The word *graha* (from the root *grah*=to grasp or to seize) refers to any heavenly object, which can move and hence can 'grasp' or 'seize' a star. Thus, it can refer to a planet or to a comet. It is true that nowadays in Indian astronomy, the word *graha* denotes only a planet. But, Vyāsa leaves no doubt to the fact that in Bhīṣmaparvan, the word *graha* refers to a comet:

"grahau tāmrāruṇaśikhau prajvalitāvubhau" (*MB* VI. 3. 24)
'the two *grahās* blazing with coppery red hair'.

The heavenly object *graha* blazing with red hair in the context here can only refer to a comet. It may be noted that the word comet itself derives from the Greek word for hair.

Vyāsa refers to son of Sun, *sūryaputra*, explicitly, but he also refers to the comets by the name of the parent planets, i.e., Jupiter to indicate the comet son of Jupiter. While this is quite according to the Sanskrit grammar, it is this notation that has caused so much confusion and most scholars have interpreted them literally as referring to planets alone (instead of the comets which must have been meant). This has resulted in inferring conflicting planetary positions, when in actuality no planetary position is indicated.

In the final segment, Vyāsa describes the omens, which indicate the destruction of the entire population:

caturdaśīṁ pañcadaśīṁ bhūtapurvāṁ ca ṣoḍaśīṁ/
imāṁtu nābhijānāmi amāvāsyāṁ trayodaśīṁ// (*MB* VI. 3. 28)

candrasūryāvubhau grastāvekamāse trayodaśīṁ/
aparvaṇi grahāvetau prajāḥ saṁkṣapayiṣyataḥ// (*MB* VI. 3. 29)

"I know new Moon coinciding with fourteenth, fifteenth and also on the sixteenth day, but I have never known it coinciding with the thirteenth day. In one and the same month, both the Sun and the Moon are eclipsed on the thirteenth. These ill-timed eclipses indicate destruction of the people."

This segment contains the famous reference to sequence of two eclipses within an interval of thirteen days and in fact, almost identical to the omens described in *Atharvaveda Pariśiṣṭha*:

yadi tu rāhurubhau śaśibhāskarau
grasati pakṣamanantaramantataḥ/
puruṣaśoṇitakardamavāhinī
bhavati bhūr naca varṣati mādhavaḥ// (*AP* 53.3.5)

THE IMPORTANT PLANETARY CONFIGURATIONS

The important references to planets consist of those that are common to both *Udyoga* and *Bhīṣmaparvans* and include the following:

(i) conjunction of *śani* with *rohiṇī*
(ii) retrograde motion of *aṅgāraka* just before reaching jyeṣṭhā
(iii) a lunar eclipse on the *kārtika pūrṇima*, followed by
(iv) a solar eclipse at *jyeṣṭha*.

These events leads to a unique year for the war. All other references in the epic are consistent with this date.

VIII. SIMULATIONS USING PLANETARIUM SOFTWARE AND THE DATE OF THE WAR

A search is made for the years in which there is a conjunction of Saturn (*śani*) with Aldebaran (*rohiṇī*) between 3500 BCE and 500 CE. As Saturn takes an average of 29.5 years to go around the sun once, the event also repeats with the same period. There are 137 such conjunctions during the interval specified above. A search is then made for those years from among these 137 dates when Mars (*aṅgāraka*) is retrograde before reaching Antares (*jyeṣṭhā*). Since the retrograde motion of Mars repeats with the same period as its synodic period, a spread of two years on either side of each of the dates was considered in the search. The search reduced the set to just seventeen: 3271 BCE, 3067 BCE, 2830 BCE, 2625 BCE, 2388 BCE, 2183 BCE, 1946 BCE, 1741 BCE, 1503 BCE, 1299 BCE, 1061 BCE, 857 BCE, 620 BCE, 415 BCE, 28 CE, 233 CE

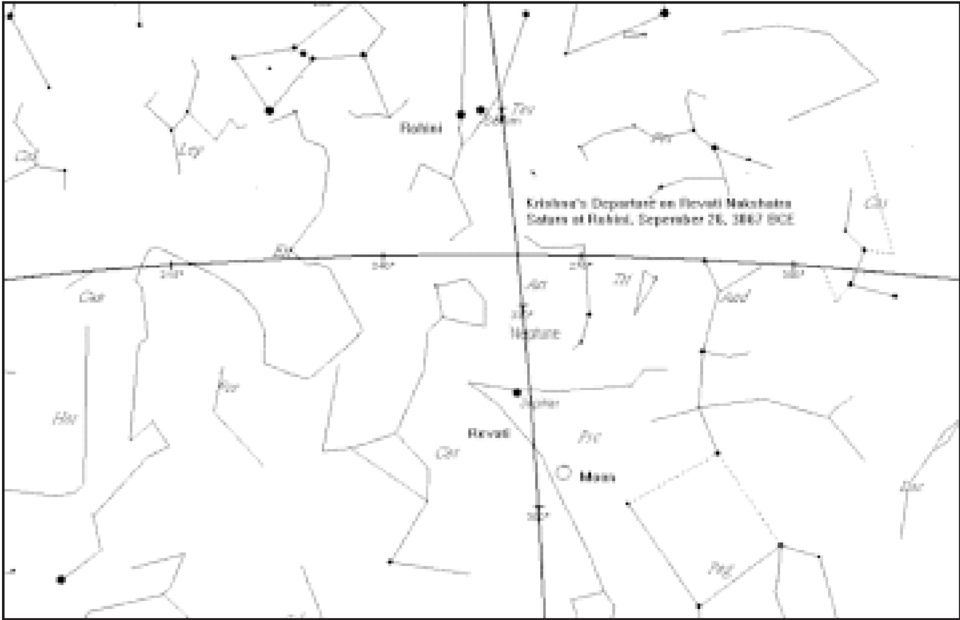


Fig. 3. Kṛṣṇa's mission for peace: departure on September 26, 3067 BCE.



Fig. 4. Full moon of kārtika. Lunar eclipse day, September 29, 3067 BCE.

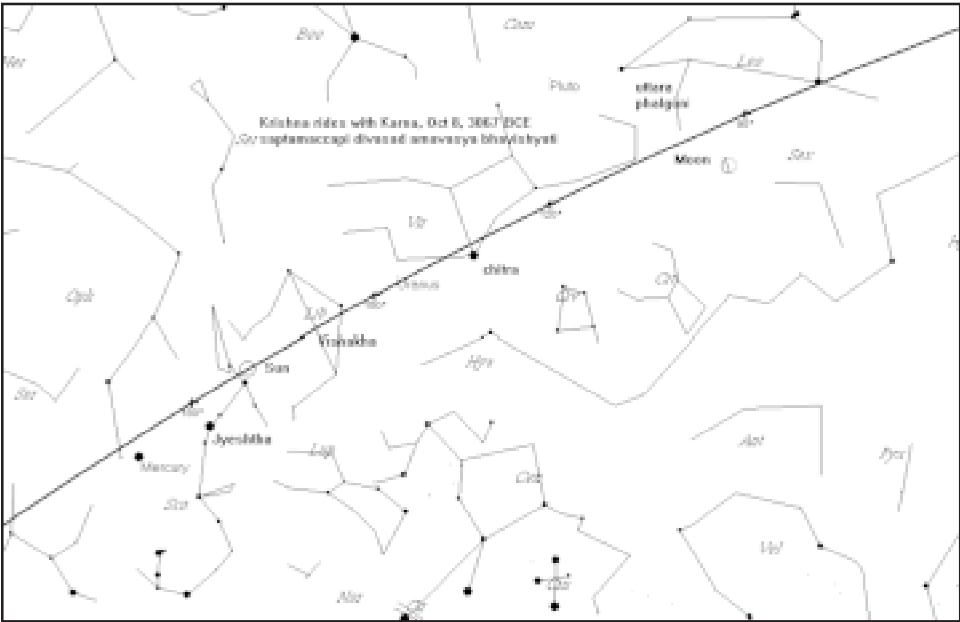


Fig. 5. Karṇa rides with Kṛṣṇa. *Uttara phālguni nakṣatra.* October 8, 3067 BCE.

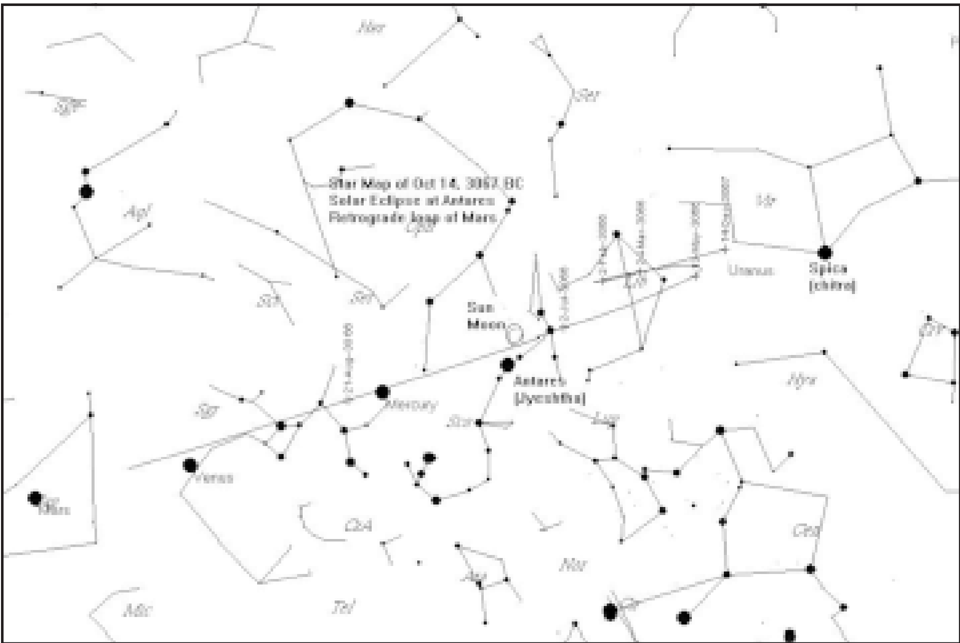


Fig. 6. *Jyeṣṭha amāvāsya* solar eclipse day, October 14, 3067 BCE;
Retroloop of Mars.

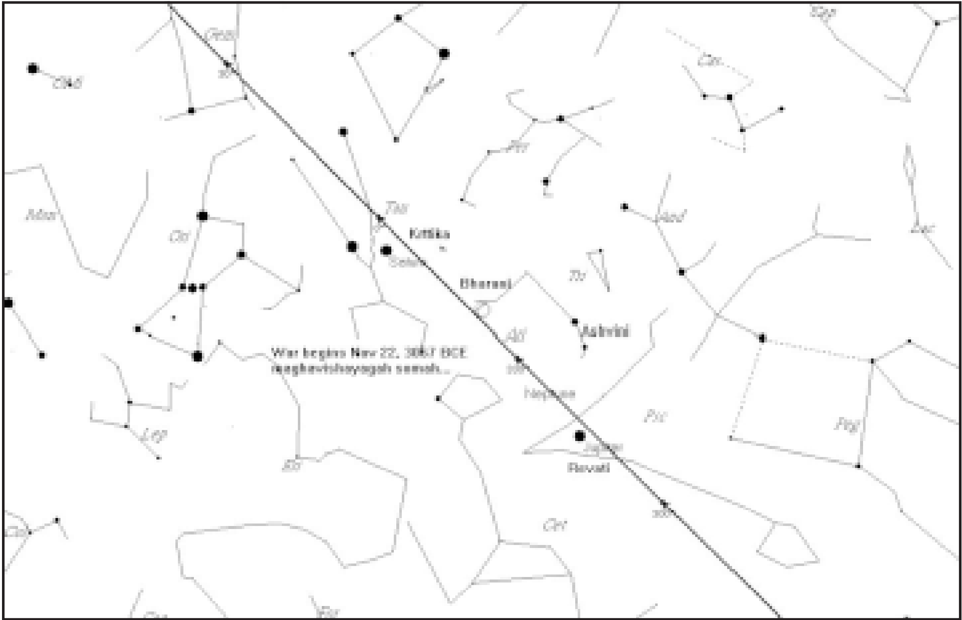


Fig. 7. War begins. November 22, 3067 BCE. It is *bharaṇi* day.

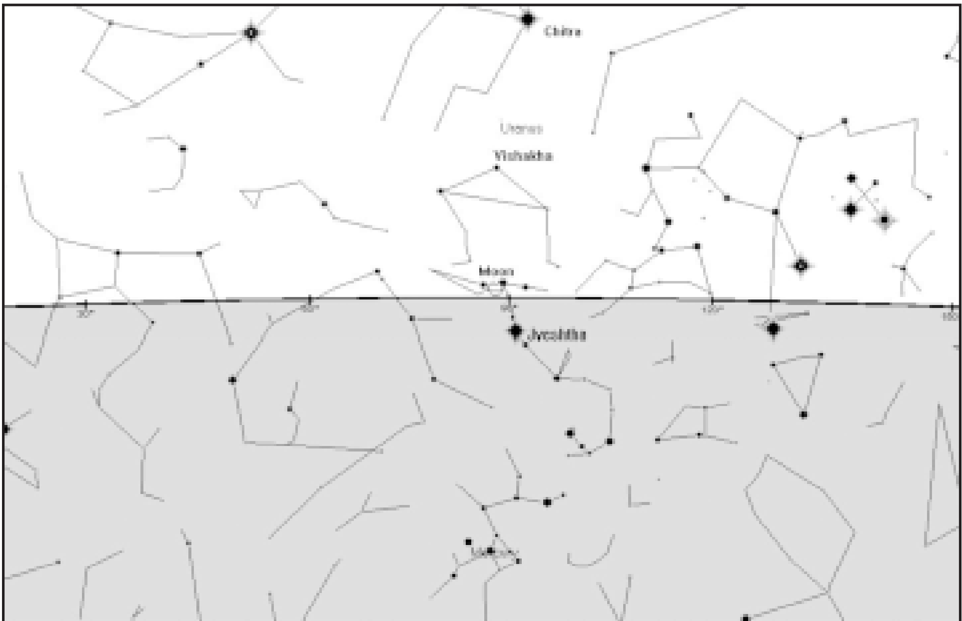


Fig. 8. Fourteenth day of war. Moon rising at 2:30 a.m. seen just above the horizon.

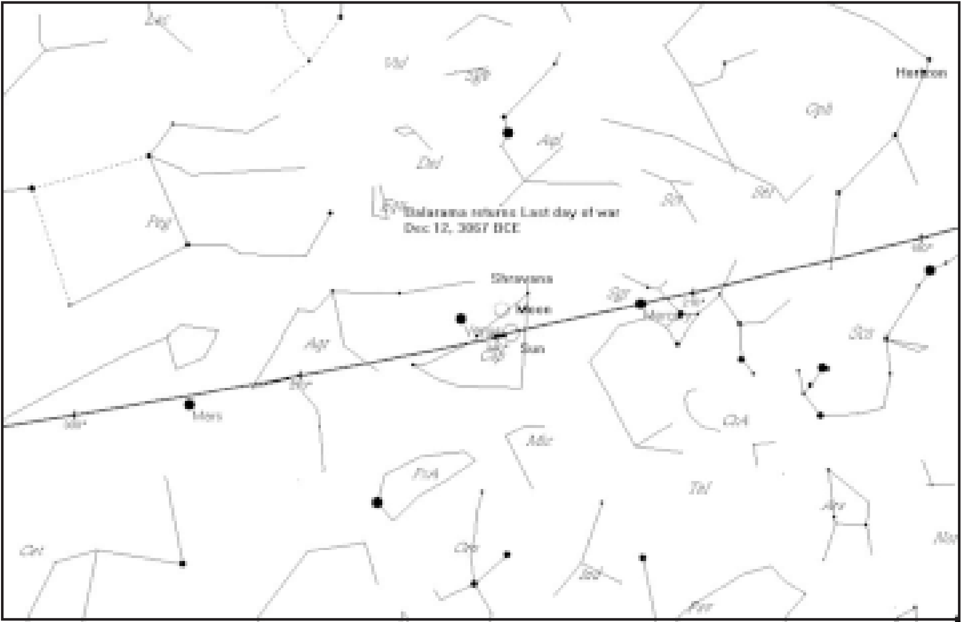


Fig. 9. Last day of the war. Balārama returns on the *śravaṇa* day.

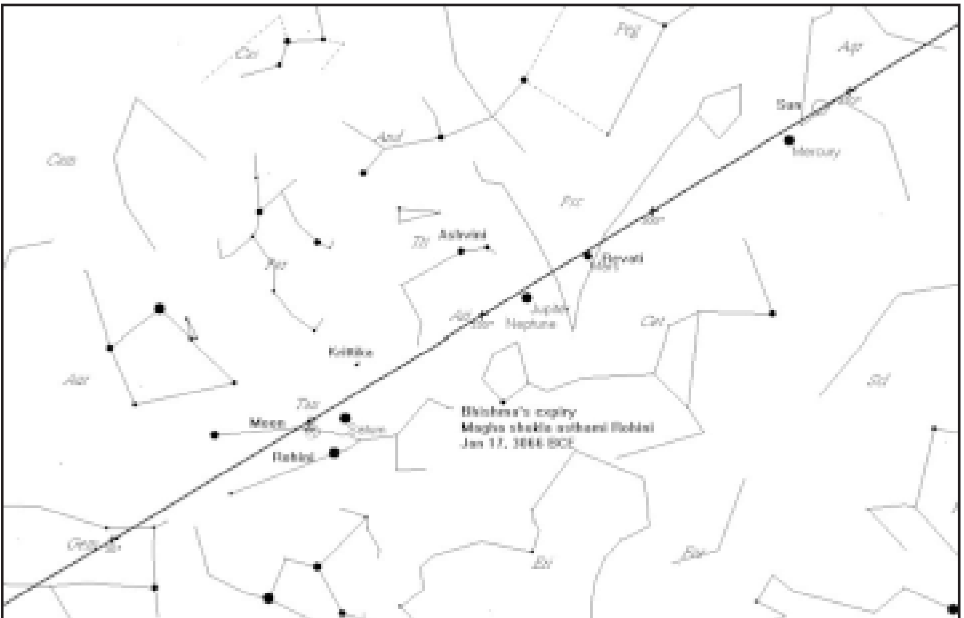


Fig. 10. Bhīṣma's expiry. *Māgha śukla aṣṭami rohiṇi nakṣatra.*
January 16, 3066 BCE.

and 470 CE, when Saturn was near Aldebaran and Mars executed a retrograde motion before reaching Antares. A search is then made for those years in which there is a lunar eclipse near Pleiades (i.e., on the *kārtika pūrṇima*). This reduces the set to just two, 3067 BCE and 2183 BCE. It turns out that in both of these years the lunar eclipse is followed by a solar eclipse at *jyeṣṭha*. A sequence of 'two eclipses within a period of 13 days' also occurs in the two eclipse seasons. When one considers the fact that Bhīṣma passed away on the *Māghaśuklaaṣṭamī*, after the occurrence of winter solstice, a unique date results, for the winter solstice in January 13, 3066 BCE occurred on *śuklapañcamī*, whereas the winter solstice in 2182 BCE occurred on *kṛṣnacaturthi*.

Thus, a unique date of 3067 BCE for the date of the war emerges. The author has shown that this date is consistent with all the other astronomical references in the epic in several publications with the help of copious illustrations of star maps generated by planetarium software. Some of them will be included as part of this essay by way of illustration.

VIIIA. ILLUSTRATIONS

The star maps in figures 3-10 show that the astronomical events are reproduced. In (Fig. 3), the day Kṛṣṇa starts on his diplomatic mission, it is clearly seen that moon is near *Revati*, and *Śani* is at *Rohiṇī*. Fig. 4 shows the

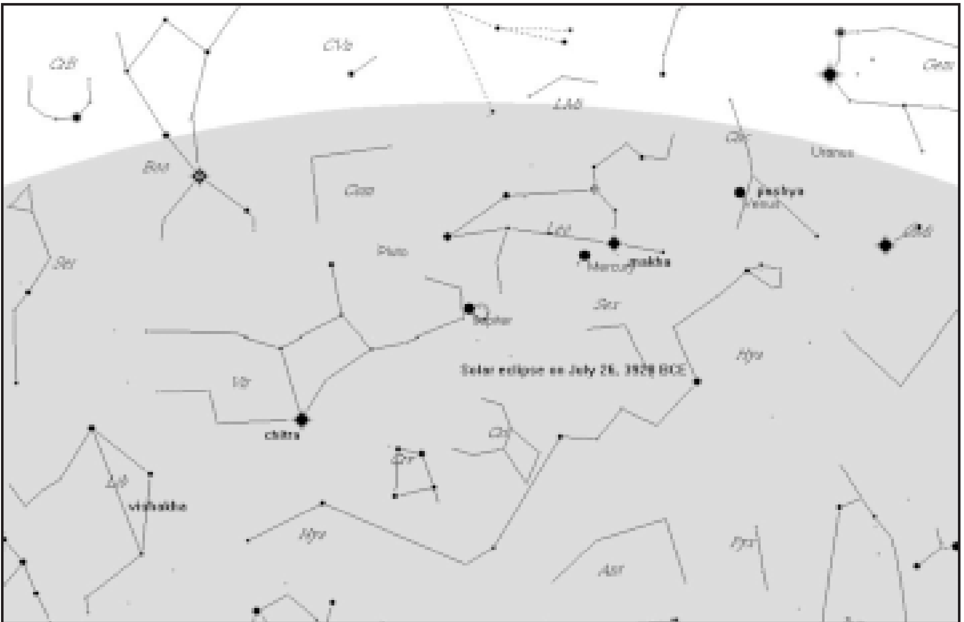


Fig. 11. Solar eclipse on July 26, 3928 BCE.

full moon in *kārtika*, it also happens to be a lunar eclipse day. At this time, Kṛṣṇa is busy with the peace talks in Hastināpura. In (Fig. 5), Kṛṣṇa rides with Karṇa after the failure of the peace mission, it is *uttaraphālguṇī*. Seven days from that day, it will be *amāvāsya* at *jyeṣṭha*. Kṛṣṇa sends the message to Bhīṣma and Droṇa to start the war rituals that day. Fig. 6 shows the star map for that that day, which is also a solar eclipse day. The retrograde loop of Mars in that year is also shown in the figure. The retrograde motion of Mars before reaching *Jyeṣṭha* had occurred several months earlier. Fig. 7 shows the day the war starts: moon is at *bharaṇī*. Fig. 8 shows the fourteenth day, when the war continues until the wee hours of the morning and stops when the moon rises. Fig. 9 shows the last day of the war, it is *śravaṇa nakṣatra* and Balarāma returns. Fig. 10 shows the day of Bhīṣma's expiry: *śukla aṣṭamī*, *rohiṇī nakṣatra*.

The sheer volume of astronomical data and the consistency of the astronomical references reinforce conclusively the traditional belief that the war took place about five thousand years ago, and that the astronomical references are not clever interpolations of some latter day astronomer.

IX. CONSISTENCY WITH THE DATES OF OTHER VEDIC TEXTS

It will be interesting to verify astronomical information contained in other Vedic texts and determine the dates based on simulations using planetarium software and to see if these dates are consistent with the date of Mahābhārata.

For example, based on the astronomical information from Ṛgveda, Sengupta[32] inferred a solar eclipse on July 26, 3928 BCE. Fig. 11 shows the star map for this date. As verified by the software RedShift, it is a central solar eclipse, which occurred two days after the summer solstice that year, as per Sengupta's conjecture. However, some caution must be exercised. As has been discussed in detail by the author, in the planetarium software, the positions of the planets and the stars are computed using the latest theories and information available and they are highly reliable. However, there are uncertainties when it comes to determining eclipses on dates extrapolated to 4000 BCE. These uncertainties which may amount to about 15 minutes when extrapolated to dates around 1000 CE, jump to more than 12 hours for the time of the occurrence of the eclipse when extrapolated to 3000 BCE, and even more when taken to 4000 BCE. The exact location of the eclipse and the exact time of visibility are uncertain, but the occurrence of the eclipse itself is certain. As a consequence, determining the date on the basis of eclipse data alone is risky. However, the eclipse data can be used as secondary information to confirm that it occurred on a particular date.

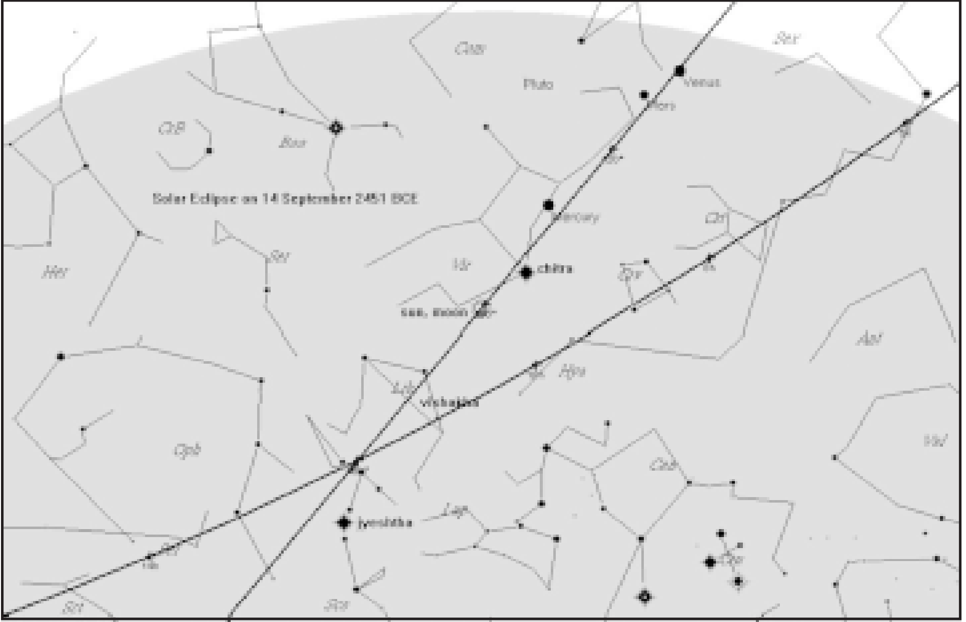


Fig. 12. Solar eclipse on September 14, 2451 BCE.

However, there are other astronomical data available in the *Brāhmaṇa* texts. As already mentioned, *Śatapatha Brāhmaṇa* refers to *kṛttikās* rising exactly in the east. On the basis of simulations using the planetarium software,[33] the date of the event referred to has been shown to be 2925 ± 100 BCE, quite in agreement with Dikshit.[34] Considering that this text is attributed to Yājñavalka, a disciple of Vaiśaṁpāyana, who is an important narrator of the epic, the date of 3067 BCE for the war is consistent with the date of *śatapatha brāhmaṇa*. As shown[35] earlier (also on the basis of simulations using the Planetarium software) that Lagadha's *Vedāṅgajyotiṣa* should be dated to be about 1800 BCE. The astronomy followed at the time of the Mahābhārata war is *Vedāṅgajyotiṣa*, but is very much pre-Lagadha. The date of Lagadha's *Vedāṅgajyotiṣa* is also consistent with the date of the war. It may be noted in passing that *Śatapatha Brāhmaṇa* mentions both Parikṣit and Janamejaya. This is an independent check on the date of the war. A passage in the *Pañcaviṁśa Brāhmaṇa* (XXV. 15.3) connects Janamejaya with the *sarpayāga* and has been referred to by Raychaudhuri.[36] The date of a solar eclipse mentioned in the *Pañcaviṁśa Brāhmaṇa* text has been determined by Sengupta[37] to be September 14, 2451 BCE. This date is consistent with the date of the war and the date of the other *Brāhmaṇa* texts and confirmed by the star map for this day in (Fig. 12).

X. CONCLUSIONS

Many of the prevalent notions about Vedic astronomy have been re-examined and are found to be modified. All the *nakṣatras* have been known since Ṛgveda, and not just a few. There is not a chronological development in the list of *nakṣatras*. The scheme of naming months on the basis of the full moon occurring near a *nakṣatra* also goes back to Ṛgveda. That means the astronomical knowledge is truly ancient. A new set of identification for the Vedic *nakṣatras* has been carried out. The newly identified bright stars are closer to the ecliptic and are better suited to act as markers for the paths of the sun and the moon. These *nakṣatras* in conjunction with astronomical information from the Vedic texts can be used to determine the dates. The date of *Śatapatha Brāhmaṇa* as determined confirms Dikshit's theory. A unique date for the Mahābhārata war as determined agrees with Professor Raghavan's. The date of *Pañcaviṁśa Brāhmaṇa* as determined by Sengupta has been confirmed and is consistent with the other dates discussed in the paper. These provide the elements of chronological background in our quest to understand the role of the river Sarasvati and its influence on Hindu Civilization.

LIST OF ABBREVIATIONS

AP	*Atharvaveda Pariśiṣṭha*
MB	*Mahabharata* (Critical Edition)
MNU	*Mahānārāyaṇopaniṣat*
RJ	*Ṛgjyotiṣa*
SB	*Śatapatha Brāhmaṇa*
VJ	*Vedāṅgajyotiṣa*

NOTES

1. The boundaries of Kurukṣetra are described in the verse: *dakṣiṇena sarasvatyā uttareṇa dṛaṣadvatīṁ /ye vasanti kurukṣetre te vasanti triviṣṭupe//* (*Mbh*. III. 81. 175).
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22. Kota Venkatachelam (1954). *The Plot in Indian Chronology,* Vijayavada: Arya Vijnana.
23. *antare caiva saṁprāpte kali dvāparayorabhūt/*
    samantapañcake yuddhaṁ kurupāṇḍava senayoḥ *MBh.* I.2.9
24. D.C. Sircar (1969). 'The Myth of the Great Bharata War', in *The Bharata War and the Puranic Genealogies*, University of Calcutta, pp. 11-27.
25. S.P. Gupta and K.S. Ramachandran (1976). *Mahabharata, Myth and Reality-Differing Views*, Delhi: Agam Prakashan.
    S. Sathe (1983). *Search for the Year of the Bharata War*, Hyderabad: Navabharati Publications.
26. E. Vedavyas (1986). *Astronomical Dating of the Mahabharata War*, Delhi: Agam Kala Prakashan. This is an exceptional book with an encyclopedic survey of literature on the topic. The date proposed in this work, 3138 BCE does not quite agree with the astronomical configurations as discussed here.
27. Sathe (1983).
28. P.C. Sengupta (1947). *Ancient Indian Chronology*, Calcutta: University of Calcutta.
29. S.U. Kamath (ed.) (2004). *The Date of the Mahabharata War Based on Astronomical Data,* Bangalore: Mythic Society.
30. It has been common to make ad hoc assumptions to fit whatever model one is proposing and to bring some degree of consistency in the astronomical references in the epic. For example, Sengupta [14] assumed that the pair of eclipses had occurred two years before the war and later inserted into the text. Sharma (quoted by Iyengar in his paper in [15], p. 151) assumed that Vyāsa met Dhṛtarāṣṭra not just once on the eve of the war, but several times and the planetary positions refer to different times. Iyengar (in [15], p. 167) assumed that part of the text in *Bhīṣmaparvan* actually belongs to *Sabhāparvan*.
31. M. Ramakrishna Bhat, *Varāhamihira's Bṛhatsamhitā,* Part I. Edited with English translation, Delhi: Motilal Banarsidass, 1981. According to Varāhamihira, the ancient Indian astronomers Parāśara and Garga had observed hundreds of comets and regarded the comets as indicators of impending calamities.
32. Sengupta (1947). p. 120.
33. B.N. Narahari Achar (2000). 'On the Astronomical Basis of the Date of Śatapatha Brāhmana: A Re-examination of Dikshit's Theory', *Indian Journal of History os Science* 35(1): 1-19.
34. S.B. Dikshit.
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37. Sengupta (1947).

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11

Chronology of Bhārata: Reckoning Time

B.N. Narahari Achar

INTRODUCTION

It is perhaps no exaggeration to say that one topic about which so much has been written and yet remains misunderstood and misrepresented as mere fancy is the topic of traditional time reckoning in terms of *kalpa, manvantara* and *yuga*. The first reaction of the 18th century Western scholars who had grown up with the tradition of the world having been created in 4004 BCE, on encountering the immense time scales of the *yuga* system, was one of disbelief and to declare them as mere fancy. That an earlier Arab scholar, Albiruni, had expressed similar opinions only strengthened their arguments. Later, when geological time scales discredited the 6000-year-old world view, so much had already been written about the system of time reckoning in ancient India that the same old criticisms continued to be repeated by these 'rational' thinkers. It is the purpose of this paper to present the recent findings of the author on the topic of time reckoning for purposes of chronology and in particular on *kalpa, manvantara* and *yuga* systems and on the *saptarṣi* era.

Traditionally, in India, all knowledge is traced to the Vedas. In discussing the development of a particular branch of knowledge in India, say, astronomy, one of the practices of especially Western scholars is first to declare that a particular concept is not found in the *Ṛgveda,* even though it may be found in other Vedas. This automatically brings down the antiquity of the concept. Then an elaborate theory is formulated as to how that concept was borrowed from Greeks or others, building on and sometimes supporting the now defunct ***Aryan Invasion Theory (AIT).*** Since this paper is concerned

with the chronology of *Bhārata* and the methods are based on astronomy, the first task is to examine some basic concepts of astronomy in this light.

NAKṢATRA AND THE *CAITRĀDI SCHEME*

The hallmark of ancient Indian astronomy is the system of 27 or 28 asterisms. However, scholars have created some problems. First, they declared that the complete list of *nakṣatra*s is not found in *Ṛgveda*, even though such lists are found in *Atharvaveda, Taittirīya saṁhitā*, etc. This included not only Western scholars, who were bent on finding an outside source for the knowledge of *nakṣatra*s, but also Indian scholars such as Dixit and Kane. This amounted to questioning the very root of *jyotiṣa*. The second problem with the *nakṣatra*s was their identification with modern names. Scholars such as Pingree proceeded from the longitudinal data of the *yoga tāra*s of the *siddhānta* texts of astronomy, converted them to Right Ascension, and Declination, extrapolated the converted data the current epoch of 1900 CE, compared with the listings in a modern star catalogue to identify the stars. Because of the errors associated with the conversion and the extrapolation of the data, the results were not completely satisfactory and of course, this provided another ammunition for these scholars to push the argument that Indian astronomy had no tradition of observation! The identification list produced by the Calendar Reform Committee (CRC) headed by Professor Saha has not been recognized by the Western scholarship, which still clings to the Pingree idealogy.

Taking the clue from *Vedāṅgajyotiṣa*, that each *nakṣatra* is presided by a deity, and that the *nakṣatra* can be specified either by its own name or by the name of the presiding deity, the author showed that *Ṛgveda* contains lists of deities corresponding to the presiding deities of *nakṣatra*s at many places, thus showing that the knowledge of the complete list of *nakṣatra*s was well recorded in *Ṛgveda*. This established at one stroke the antiquity of the astronomical knowledge and blew the theory of extraneous origin for their knowledge.[1] Recognizing the difficulties associated with the Pingree method of identification of modern star names for the *nakṣatra*s, the author then employed a modern computer software, Planetarium software, in combination with a computer programme called *pañcāṅga* and examined some 900 full moons and new moons, and has produced a new identification list.[2] Most of the identifications agree with that of the CRC report (Table 1), but there are significant changes for six of them. This turns out to be very important for purposes of chronology. For example, this confirms[3] the date assigned to *Śatapatha brāhmaṇa* by Dixit as 3000 BCE, but revises[4] the date assigned to *Vedāṅgajyotiṣa* to about 1800 BCE.

Based on the importance of determining correct times for performing the ritual *yajña*, and that there are specific deities associated with *nakṣatra*s, the author has demonstrated[5] that the *caitrādi* scheme of naming months is as old as *Ṛgveda* itself and Dixit's idea of assigning a date of 1800 BCE for the beginning of that scheme is not tenable. All this goes to show that the fundamental calendar ideas were well known in *Ṛgveda*, only detailed explanations are found in the *brāhmaṇa* texts, notwithstanding the scholarly pronouncements to the contrary. The same goes for the concepts of the *yuga* system and the *saptarṣi* era, which are examined in the following sections. It is shown that the basics are traceable to *Ṛgveda* even though detailed explanations are found in other places. The idea that the concepts were not known earlier in *Ṛgveda* or that the concepts were borrowed from some outside non-Vedic source is to be rejected.

KNOWLEDGE OF THE YUGA SYSTEM

It is well known that in *Vedāṅgajyotiṣa*, a period of five years is referred to as a *yuga* and that in the *siddhānta* texts of astronomy, *yuga* refers to a much larger unit. In particular, *kaliyuga* encompasses 1200 divine years (each of which equals 360 human years), while *dvāpara, tretā* and *kṛta yuga*s consist respectively of 2, 3 and 4 times the number of years in *kali* (Āryabhaṭa gives a slightly different count, giving a division into four equal parts rather than the arithmetic progression of the ratio 1:2:3:4). The quartet makes one *mahāyuga*, 71 *mahāyuga*s make one *manvantara* and 14 of which constitute a *kalpa*. In human years this works out to be 4.32 billion years including the periods of transition between the *yugas*. According to the astronomical works, *kaliyuga* started on 17/18 February 3102 BCE, the number of elapsed days from that date (*ahargaṇa*) is used for computing planetary positions. Scholarly opinion is almost unanimous in dismissing the beginning of *kaliyuga* as purely artificial, arrived by the astronomers around 400 CE by back calculation, and made popular by the *purāṇic* authors. The traditional significance associated with the deterioration of *dharma* with the progress of the *yugas* has also been discredited as the concoction of the authors of *purāṇa* texts. The sheer duration of the time scales is dispensed with as the pure fancy of the latter day astronomers, chosen as a method of finding the largest common factor for the periods of planetary motion. A huge literature exists on the topic, with contributions from great scholars such as Fleet and Kane and Dixit, only to cite a few. The main conclusion of all this activity is to proclaim that *kaliyuga* of 3102 BCE is not of any historical origin, i.e., it is not based on the occurrence of any actual event in 3102 BCE, and there is no evidence of its running in actual use as a historic era from that time. Some

scholars have tried to show that the *yuga* system is really related to the period of the precession of the axis of rotation of the earth, approximate it by 24000 years, and claim that a factor of 360 was introduced by astronomers (the blame to be shared equally by the authors of *purāṇa*) to produce the number 4320000=12000 x 360. Against this background, the first job is to trace the origin of the concept of *yuga*.

When looking for snippets of references to astronomical or other mundane matters in the Vedas, we must remember that the primary purpose of the Vedas is something entirely different, and the seers (*ṛṣis*) probably would not have had in mind the 'rational enquiry' of the modern day scholars. In any case, any such reference would only be perfunctory and the detailed explanation would be left for the *brāhmaṇa* texts and other *vedāṅga* texts. So, it is not correct to say something like '*Ṛgveda* mentions only a few of the *nakṣatra*s, whereas the full list is available only in a *brāhmaṇa* text. So it was a later development'. In fact, the author has shown that the entire list of *nakṣatra*s is available in *Ṛgveda*. The following statement must be remembered: *parokṣapriyāhi devāḥ* ...

Perhaps it is not an exaggeration to say that the Hindu Civilization had developed the most sophisticated ideas about Time, going all the way back to the Vedas. From the beginning two distinct aspects of Time were recognized, a macro and a micro aspect. Failure to recognize these two aspects and mistaking the cycles of Time with the cycles in time has resulted in misunderstanding the whole concept of *kalpa,* etc. and discrediting the use of *kaliyuga* as an element of chronological record-keeping on the one hand and misrepresenting the history of *Bhārata* on the other.

YUGA AND *KALPA* IN *ṚGVEDA*

According to Kane, the word *yuga* occurs some 33 times in *Ṛgveda*, the most prominent meanings being a short and a long period. In '*dīghatamā māmateyo jujurvāndaśame yuge*', (*RV*. I.158.6). (Dirghatama, son of Mamata became old in the tenth *yuga*), *yuga* obviously refers to a short period of five years.

In '*aśvo na krandajjanibhiḥ samidhyate vaiśvānaraḥ kuśikebhir yuge yuge*', (*RV*. III. 55.18) (like a neighing horse by its mother, agni is kindled by the *kuśikā*s in each *yuga*), *yuga* may mean everyday. In '*tvāṁ dūtamagne amṛtaṁ yuge yuge havyavāhaṁ dadhire pāyumīdhyaṁ*' (*RV*. VI. 15.8) (Oh deathless agni, men have made you in every *yuga* their envoy, bearer of offerings, guard adorable, *Sāyaṇa* explains *yuge yuge* as *kāle kāle, yattadyāga anuṣṭhāna samaye*, every time appropriate for performing *yāga*. In '*yuge yuge vidathyaṁ gṛṇadbhyo agne rayiṁ yaśasaṁ dhehi navyasīṁ*' (*RV*. VI. 8 5) (Oh agni, in every age bestow upon the singers, wealth, glory, ever anew). *Sāyaṇa* again explains *yuge yuge* as *kāle kāle* just as in the previous quote.

However, in '*yā auṣadhīḥ pūrvājātā devebhyaḥ triyugaṁ purā*' (*RV*. X.97.1), *Nirukta* explains as *devebhyaḥ trīṇi yugāni purā*, while *Sāyaṇa* explains as *kṛtādi yuga trayaṁ*, the three *yugas* beginning with *kṛta*. Clearly, the reference here is to a long duration of time with the well known divisions of what is now referred to as a *mahāyuga*.

In '*sa hi mānuṣā yugā sidadhotā kavikratuḥ*' (*RV*. VI.16.23) *Sāyaṇa* explains *mānuṣā yugā* as *mānuṣāṇi yugāni*, as pertaining to the scale of human *yugas*.

Kane has pointed out that there is a clear reference to the four *yugas* and that the *yugas* meant a very long period of time, several thousand years in '*śataṁ te yutaṁ hāyanāndve yuge trīṇi catvāri kṛṇmaḥ*' (*AV*. VIII. 2.21) (We make your hundred years of life span ten thousand years extending over two, three, four *yugas*).

The words *kṛta, tretā, dvāpara*, and *āskanda* (for *kali*) occur in *Taittirīya saṁhitā, Taittirīya brāhmaṇa* and *Śatapatha brāhmaṇa*. Even the concepts of deterioration (of *dharma*) with progress of *yugas*, explained in great detail in the *purāṇa* texts can be traced to *Aitareya brāhmaṇa: 'kaliḥ śayāno bhavati sañjihānastu dvāparaḥ uttiṣṭhaṁstretā bhavati kṛtaṁ sampadyate caran* ' (*AB*. 33.3). *Muṇḍakopaniṣat* refers to the *yājñik* rites performed in the *treta yuga*: '*tadetad satyaṁ mantreṣu karmāṇi kavayo yānyanapaśyaṁ stāni tretāyāṁ bahudhā santatāni* '(*MU*. I.2.1)

According to Kane, even the idea of *kalpa* is attested in '*sūryā candramasau dhātā yathā pūrva makalpayat*' (*RV*. X. 190.3). According to Dixit, *Nirukta* defines *Brahmā*'s day as 1000 *yugas*, although it does not specify which *yuga* is meant, it is thought that it refers to the divine scale. In fact, the factor of 360 between the human and divine scales is specified in '*ekaṁ vā etaddevānāmāhaḥ*' (*TB*. III. 6. 22) (one year of the humans is one day of the *devas*).

It is clear that the concepts of the *yuga* system, including the *kalpa*, are all traced to Vedic sources, including the factor of 360. The fact that *kalpa* is referred to in the epigraphs of Aśoka should put an end to the speculations that these were introduced by latter day astronomers of the 5th century CE. Furthermore, these scales of time are cosmic in the sense they are connected with *jagat sṛṣṭi* can be seen from the exposition on time in *Atharvaveda*.

TIME IN *ATHARVAVEDA*

One of the most sublime conception of time is embodied in two *sūkta*s of *Atharvaveda* (*AV*. XIX. 53 and 54). The first *sūkta* starts with a metaphor for time, in which time is pulling a chariot:

> *kālo aśvo vahati saptaraśmiḥ sahasrākṣo bhūriretāḥ*
> *tamārohanti kavayo vipaścitastasya cakrā bhuvanāni viśvā*
>
> (*AV*. XIX.53.1)

The vast chariot (representing the sun) whose wheels are composed of all the existing creatures is pulled by time in the shape of a horse. The vision is cosmic in range and metaphysical in tone. The enigmatic verse

pūrṇaḥ kumbho adikala āhitastaṁ vai paśyāmo bahudhānu santaḥ
sa imā viśvā bhuvanāni pratyaṅ kālaṁ tamāhuḥ parame vyoman
(*AV.* XIX. 53.3)

has been discussed by the author. It has been shown that this implies the use of water clock for measurement of time, the possibility of existence of different forms of water clock. The concept of time as Cosmic is exemplified by the following:

kālo ha sarvasyeśvaro yaḥ pitāsīt prajāpateḥ (*AV.* XIX.53.8)
kālo ha brahma bhūtvā bibharti parameṣṭhinaṁ (*AV.* XIX.53.9)

This is reflected in the statement from the *Bhagavadgīta*:

kālosmi loka kṣayakṛt pravṛttaḥ (*BG.* XI. 32

It is clear from the above discussion that the concepts of *yuga*, the four *yuga*s, *kali*, *dvāpara*, *tretā* and *kṛta* have been known for a long time and that they can all be traced to Vedic sources. It is also clear that this has nothing to do with the period of precession of the earth's axis and that the factor 360 was not invented by the astronomers of the early centuries of CE. The questions that remain to be addressed are the beginning of *kali* era in 3102 BCE and the *saptarṣi* era for chronological reckoning. This will be taken after a brief discussion of time in the Vedic texts.

TIME IN THE VEDIC TEXTS

Taittirīya araṇyaka contains an excellent exposition on time: *smṛtaṁ kāla viśeṣaṇaṁ* It goes on to say that in particular, *kālā samvatsaraggśritāḥ aṇuśaśca mahadbhiśca* there are two aspects, a macro and a micro aspect. The entities *kalā, muhūrtāḥ kāṣṭhāḥ,* etc. comprise the micro aspect, where as *kalpa* refers to the macro. In *Śatapatha brāhmaṇa*, there is an equivalence of *prajāpati* with *samvatsara* and the fire altar. '*daśa ca vai sahasrāṇyaṣṭau ca śatāni samvatsarasya muhūrtāḥ* ' there are 10800 *muhūrta*s in a year. This is also the number of *paṅkti*s in *Ṛgveda*. Considering that there are 40 syllables in a *paṅkti*, this gives the nominal count of syllables in *Ṛgveda* to be 432000, the number of years in *kaliyuga*.

TIME RECKONING

Of the two time scales, the macro or the cosmic time scale in terms of *kalpa manvantara, mahāyuga* and *yuga* would be useful only to describe large scale

phenomena of the universe such as *sṛṣṭi*, but would not be appropriate to describe events on the human scale. On a very short term basis, it does not have the correct number of days even, based on the factor of 360. The five year *yuga* comes in handy for that purpose. It is properly luni-solar adjusted. However, it would not be suitable for time reckoning on a long term basis, as the adjustments are not fine enough and would quickly fall out of step, if not corrected frequently. It was amid such a dilemma that the ancient *ṛṣis* found a useful era, the *saptarṣi* era for purposes of chronology. Accordingly, the *saptarṣis* move around and spend a 100 years in each of the 27 *nakṣatra*s making a cycle of 2700 years. *Saptarṣis* are representative of many aspects of human life, including the breaths. Of course, one of the representations is the Big Dipper in the sky. There is no motion of the Big Dipper among the *nakṣatra*s along the ecliptic that can be associated with this motion. There have been some recent attempts to find an astronomical justification for this supposed movement by using Planetarium software. But such efforts do not have any credibility as such for the astronomical movement of the Big Dipper. To relate what might have been a slight shift at one time due to the precession of the earth's axis and to develop a model based on that is not credible. But, the origin of the *saptarṣi* era can be traced to a metaphysical concept in *Taittirīyār aṇyaka*:

> *ṛṣayassaptātriyaśca yat sarve atrayo agastyaśca*
> *nakṣatraiśśaṁkṛto vasann*

The seven *atri* and other *ṛṣi*s live among the *nakṣatra*s doing good to the world. A more direct reference can be suggested from the following *ṛk* from the famous *asyavāmīya sūkta* (*RV*. I. 164.11)

> *dvādaśāram nahi tajjarāya varvarti cakram paridyāmṛtasya*
> *ā putrā agne mithunāso atra sapta śatāni viṁśatiśca tasthuḥ*

This is translated by Griffiths as follows:

"Formed with twelve spokes by the length of time, unweakened, rolls around this wheel of during order. Herein established, joined in pairs together, seven hundred sons and twenty stand, O Agni. It is a strained explanation of the word *putrāḥ* here".

A slight rearrangement of words, *sapta viṁśati śatāni (saṁvatsarāṇi) putrāḥ tasthuḥ* would mean the sons stay for 2700 years on this wheel of time rolling in the heavens. The wheel of time rolling in the heaven is the ecliptic (*dvādaśāram cakram varvarti*). The *saptṛṣi*s who are considered to be the *mānasa putrā*s of *Brahmā*, can be thought to have been referred to here, by *ā putrāḥ* above. Thus, there appears to be a direct reference to the *saptarṣi* era here. They were in *magha* at the time of Yudhiṣṭhira.

KALI ERA

Then what about the *kaliyuga*, for purposes of time reckoning which is thought to start in 3102 BCE? Let us call this *kali* era, just to distinguish it from the time interval of the same name *kali*, which is one of the quartet *kali, dvāpara, tretā* and *kṛta*, making up a *mahāyuga*. The traditional *kali* is part of the scheme to describe the *sṛṣṭi* and subsequent evolution and dissolution of the universe and is intimately connected with the status of *dharma*. It is a cosmic scale. When one *yuga* changes into another, there is no sharp change, but one diffuses into another through a transitional *sandhi* period. There was such a change of *dharma* at the time of the Mahābhārata war. In the epic there is no definite statement about when this occurred. The war itself took place at the junction:

> *antare caiva saṁprāpte kali dvāparayo rabhūt*
> *syamanta pañcake yuddham kuru pāṇḍava senayoḥ*

There is some evidence that the *kali* may have already started when the war actually took place. There are other traditions, however, that link the beginning of *kali* with the departure of Kṛṣṇa from this mortal world. *Kali* may have already started by the time of the war, but its influence was deterred as long as Kṛṣṇa's feet touched this world. As such there would be no conflict whether *kali* actually started before the war or only after the departure of the Lord. (This discussion becomes important as the date of the war based on simulations of the Planetarium software turns out to be 3067 BCE.)

Kali era is a scheme based on the count of number of days elapsed since the conjunction, in 3102 BCE, which is used for computation of the planetary positions by the makers of *pañcāṅga*. It may have been an actual conjunction observed around the time, and the date corresponding to *amāvāsya* was chosen for calendrical purposes. It bears the same name *kali* as the cosmic change took place around the same time. That the *kali* era has been in use for a long time as a chronological marker is proved by epigraphical data.

To give an example of analogous modern development, one counts the number of years from the 'Big Bang' event, in billions of years, but that count can hardly be used for chronological purposes. Astronomers use the Julian days, the number of days elapsed from January 1,4713 BCE for computing planetary positions. The difference between the *kali* of the *manvantara* scheme and the *kali* era of the *pañcāṅga* makers is exactly the same, except that *pañcāṅga* makers had done it thousands of years earlier.

CONCLUSIONS

There is a sublime sense of appreciation of Time and its nature in Vedic literature both in its cosmic and mundane aspects. Schemes developed for reckoning in terms *kalpa, manvantara* and *mahāyuga* as well as the mundane schemes of tracking in terms of the *saptarṣi* and *kali* eras are awe-inspiring.

ABBREVIATIONS

AB	*Aitareya brāhmaṇa*
AV	*Atharvaveda*
BG	*Bhagavadgita*
MU	*Muṇḍakopaniṣat*
RV	*Ṛgveda*
SB	*Śatapatha brāhmaṇa*
TB	*Taittirīya brāhmaṇa*

NOTES

1. B.N. Narahari Achar, 'In search of nakshatras in Rgveda', *Annals of the BORI*, Vol. LXXXIII for the year 2002 (2003), pp. 183-193.
2. B.N. Narahari Achar, 'On the identification of Vedic Nakshatras', in Bhu Dev Sharma (ed.), *Contemporary Views of the Indian Civilization,* New York: World Association for Vedic Studies (2003), pp 371-387.
3. B.N. Narahari Achar, 'On the Astronomical Basis for the date of Satapatha Brahmana: A Re-examination of Dikshit's theory', *Ind. Jour. Hist. Sci.* 35, 1-10 (2000).
4. B.N. Narahari Achar, 'A case for revising the date of Vedanga Jyotisha', *Ind. Jour. Hist. Sci.* 35, 173-183 (2000).
5. B.N. Narahari Achar, 'On the Caitradi Scheme', *Ind. Jour. Hist. Sci.* 35, 295-310 (2000).

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12

A New Aspect of Sarasvatī Civilization

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Discovery of the Sarasvatī-Sindhu Civilization in 1922 was a great setback to the Europeanists who were bent upon keeping down the date of Ṛgveda. But they did not accept the truth and invented several myths not only for the history of Bhārata but also in the world history. The Vedic and Paurāṇik tradition has preserved the earliest history of mankind and points out that the Uttara-Kuru (South Soviet Russia) and the Pamir region including Afghanistan and Bhārata was the earliest cradle of humanity from where the Indo-Europeans as well as Indo-Aryans dispersed throughout the globe with their languages (derived from Sanskrit), which in due course of time underwent several changes beyond recognition. During last two centuries or so the Europeanists have created some myths in world history and allotted new sense to some terms frequently used in history. Before we begin it seems necessary to clear the definitions of some of such words.

DEFINITIONS

The term 'Arya' was borrowed from the Vedas and the Sanskrit literature but was transformed into 'Aryan' to mean a European (they call Indo-European) who invaded India a few millennia back and ruled over the country; and the British were the modern incarnation of the ancient Aryas. They gave 'India' a special connotation to mean the territories conquered and ruled by the British that extended up to Baluchistan in the north-west; beyond which were foreign lands from where tribes were in the habit of invading India and rule.

BHĀRATA: A WELL DEFINED COUNTRY

In modern times notions of nation and country almost overlap. This is the contribution of post renaissance Europe. In ancient times it was not so. Several nationalities could be part of one state or political power, or, a single nation could have more than one state or kingdom. Ancient Bhārata was a well defined geographical unit having natural sea border on all three sides. In the north are formidable Himalayas. There is no other country in the world so well defined by nature. Modern historians believe that ancient Bhārata was confined up to the northwestern boundaries of the erstwhile British Raj but as we will see this was not so. The Vedic civilization was extended to the north and south of the Pamir mountains in which Bhārata was just one unit among the nine. In this short paper we intend to present an account of historical tradition and archaeological remains that go to disclose Vedic background of the region. This, I hope, will make the much debated question of Indo-European and the quest for the original home of the Indo-Aryans, irrelevant.

THE JAMBUDVĪPA AND ITS NINE VARSHAS

The history starts from Manu. His eldest issue Ilā, was an epicene. Her kingdom was Ilāvṛitvarsha in the centre of Sumeru or Pamir. The geography of Jambudvīpa is described by the *Purāṇas* with Ilāvṛitavasha in the centre. In the extreme north was the Uttarakuruvarsha, then Hiraṇymayavarsha followed by Ramyakavarsha. In the centre was Ilāvṛitavarsha. To its south the first country is Bhāratavarsha, second Kimpurushavarsha and third Harivarsha. To the east of Ilāvṛitavarsha is Bhadrāśvavarsha and to its west is Ketumālavarsha.[1] This whole region covers most of South Asia and Central Asia where the Vedic culture prevailed; and, we will discuss the earliest history and archaeology of this region. But first we will like to outline the geographical boundaries of ancient Bhārata.

NORTH AND EAST WERE THE TWO DIVISIONS OF BHĀRATA

Little attention was paid to that *sūtra* of Pāṇini[2] on which the Kāśikā says that the Dakshas lived outside the region of the eastern Bharatas. V. S. Agrawala, discussing about the Daksha tribe observes

> "That the Dakshas belonged to the north-west is suggested by the Kāśikā's discussion on Saṁjñāyaṁ kanthośīnareshu (II. 4. 20) citing a counter-example to show that the place named Dākshī-kanthā lay outside the geographical limits of Uśīnara. According to Pāṇini, Uśīnara formed part of Vāhīka (IV.2.117-118). That the Dakshas did not belong to the eastern

> part of India either is shown by another comment (Kāśikā on IV.2.113), where it is said that the Dakshas lived outside the Prāchya-Bharata region, i.e., towards west. Pātañjali's interpretation of Prāchya-Bharata on Pāṇini II.4.66 shows that the Prāchya country or eastern India began from the region of Bharata or Kuru-janapada (I.493). Strictly speaking the Bharatas although residing in east Punjab were considered to form part of the Prāchyas....The Gopatha Brāhmaṇa mentions the Udīchyas with the Madras (Gopatha, I.2.10), and the two jointly formed Vāhīka."[3]

Dr. Agrawala further notes

> The Śaradaṇḍa must have been settled along the Śaradaṇḍā river mentioned above. Nothing is known about it, but the first part of the two names Śaradaṇḍā and Śarāvatī points out to their being one and the same river. The latter formed the boundary between the Prāchya (eastern) and the Udīchaya (northern) divisions of India and may be identified with the Dṛishadvatī or Chitāṅg.[4]

Here it is to be noted that during the time of Pāṇini India had two divisions:

1) East and 2) North; i.e. not East and West. Thus the Kurus of Kurukshetra were regarded as easterners. Dr. Agrawala informs

> The region between the triangle of Thanshwar, Hisar and Hastināpura was distinguished by three different names: Kuru-rāshaṭra proper between the Gaṅgā and the Yamunā with its capital at Hastināpura; Kurujāṅgala equal to Rohtak, Hansi, Hissar; and Kurukshetra to the north with its centre at Thāneshwara, Kaithal, Karnal. The Kāśikā mentions all the three as distinct geographical units (कुरूवश्च कुरूक्षेत्रं च कुरूक्षेत्रम्; कुरूवश्च कुरूजाङ्गलं च कुरूजाङ्गलम्ए II.47).[5]

This reminds us of the Greek writer Ptolemy (2nd century AD) who was aware of two divisions of India 'India Intra Gangem and India Extra Gangem.'[6] B.N. Mukherjee asserts that "the latter (included) not only the parts of the subcontinent to the north and east of the Ganges, but also some countries of South-East Asia." But in the light of the information supplied by Pāṇini we must revise Mukherjee's opinion to accept Ganga as the dividing line instead of Dṛishadvatī during second century AD for east and west (or north) of India because the region of Afghanistan was still under the cultural embrace of India as the Yavanas, the Śakas, the Kushanas, etc. from Bactria all known to profess Indian culture.[7]

Pāṇini's information of the existence of eastern Kurus not only confirms the existence of a northern Kuru or Uttara-Kuru, so frequently mentioned

in the Vedas and the *Purāṇas*, but also indicates a very close relation between the two. Thus the Uttara-Kuru was a region where the Kurus used to live and there the Vedic civilization flourished during antiquity.[8] We may find an echo of this in the extensive archaeological remains of Andronovo and many other cultures which will be discussed later.

Uttara-Kuru is not the solitary example of a country prefixed with the term 'Uttara'. We know of a Uttara Kosala also. Rama, a prince of Ayodhya or Kosala lived in Daṇḍaka forest in the Vindhyas for fourteen years and the area became Kosala. He established a kingdom there and anointed his younger son, Kuśa, as king there. The original kingdom became Uttara Kosala. The literature mostly refers the original Kosala lying to the south and north of the river Sarayu as Uttara-Kosala and the Kosala in the Vindhyas is generally referred simply as Kosala.[9] Similarly, as we will presently see the Uttara-Kuru must have been the original kingdom of the royal family of the Ailas in beginning.

A third example is that of Madra in Punjab and Uttara-Madra beyond Himalayas. This is mentioned in *Aitareya Brāhmaṇa* (VIII. 14).[10]

It is interesting to note the geographical expanse of the country during Pāṇini's time which extended from Ferghana in Central Asia to Gandhāra, and beyond. Dr. Agrawala notes

> The extent of the country known to him (Pāṇini) is indicated by several landmarks mentioned in the sūtras. The western-most point is Prakaṇva corresponding to the term Parikanioi mentioned by Herodotus and to the modern country of Ferghana. It may be noted that Pāṇini names ṁishi Praskaṇva in sūtra VI.1.153, and from this name is derived as a counter-example, as given by the Kāśikā, the name of the country called Prakaṇva. To the south of Ferghana lay Kamboja (IV.1.175), which as will be shown later may be identified with the region of Badakshan-Pamir. South of it lay Kāpiśī (IV.2.99), capital of the kingdom of Kāpiśa, which may be identified with modern Kohistan, south of Hindukush. East of Kāpiśī was situated the country of Vrātyas (the ancient Lohita-maṇḍala, modern Kafiristan), and the Dir (Dviravatīka), and Gandhāra (IV.1.169) comprising the valley of Kabul river, with its frontier outpost at Takshaśilā (IV.3.93).[11]

Agrawala also describes, on the basis of Pāṇini, four divisions of northern portion.

> Kamboja (IV. 1. 175): Gandhāra, Kapiśa, Bāhlīka, and Kambuja are the four janapadas the relative positions of which should be clearly understood. Of these Gandhāra extended from Takshaśilā, its eastern

> capital to the river Kunara, its western boundary, and from the river Kābul in the south to Swat in the north. Next to it was the kingdom of Kapiśa coinciding with modern Kohistan and occupiying the whole area between the river Kunar and the Hindukush (*Cun. Geog.*, pp. 20-23). The latter mountain identified as Rohitāgiri separated Kapiśa from Bāhlīka. Sometimes politically formed part of Gandhāra, as in the reign of Darius, and then the name Gandhāra was applies to both of them. In none of these janapadas can Kambuja be included, It stands as a separate janapada, which Lassen correctly identified with the head-waters of the Oxus comprising the Ghalcha-speaking area of Pāmīr.
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> This identification is also supported by linguistic evidence, viz. that the root śava 'to go' which was noticed by Yāska as a peculiarity of Kamboja speech (Śvatir-gatikarmā Kambojeshveva bhāshyate, *Nirukta*, II. 2), is still current there. (Cf. Grierson, *Linguistic Survey of India*, Vol. X, pp. 468, 473, 474, 476, 500, etc.; Jayachandra, *Bhārata-Bhūmi*, pp. 297-303). The Kambojas are known as Kambujiya in Old-Persian Inscriptions. In the Aitareya Brāhmaṇa the Uttarakurus and the Uttaramadras are described as living beyond the Himālaya(VIII. 14); and the Vaṁśa Brāhmaṇa Kāmboja Aupamanyava is spoken of as a pupil of Madragāra, from which the Vedic Index postulates a possible connection of the Uttaramadras with the Kambujas, who probably had Iranian affinities, (*Vedic Index*, I, 84, 138ff. also Jean Przylusky, 'An Ancient People of the Punjab: The Udumbaras', *Journal Asiatique*, 1926, p. 11 showing that Bāhlīka was an Iranian settlement of the Madras; Bāhlīka-Uttaramadra).[12]

THE EARLIEST BHĀRATA

Thus from Uttarakuru to the plains of Sarasvatī was the scene of most of the early events that find mention in the Ṛgveda and in the early strata of Paurāṇic narrations of history. This whole geographical expanse was divided in to nine *varshas* (or segments) and Bhārata was only one among them. We can perceive that the extent of the Sarasvatī-Sindhu Civilization was the Earliest Bhāratavarsha of which the river Sarasvatī was the eastern boundary. The history of Ilā and her immediate descendents was staged in a greater geographical expanse from Uttarakuru to at least western Haryana and Gujarat including Pakistan, Afghanistan and even parts of Iran. The story of Saraṇyū, the daughter of Tvashṭā, and wife of Vivaśvat, is related to Uttarakuru.

> Saraṇyū, the daughter of Tvashṭā, was given in marriage to Vivaśvat, and had by him Yama and Yamī. Intimidated by his ardour, she substituted another female, her shadow, Chāyā, for herself, and going to

> Uttarakuru, changed herself to a mare. Vivaśvat begot Manu by Chāyā, when finding his error, he set off to look for his wife. Discovering her disguise, he transformed himself to a horse, and had by his wife the two Aśvins.[13]

This, on the one hand points out that Uttarakuru was the scene of early history, while on the other it indicates the horse breeding in the region. We will shortly see that Kurgan people and the widespread Andronovo culture to the north of Caspian, BMAC culture to its south as well as the Sarasvatī-Sindhu Civilization of Bhārata are marked by the same Vedic culture.

SOME ANOMALIES CREATED BY MODERN HISTORIANS

With this geographical background of Jambudvīpa we now turn to the Paurāṇika account of the early history of mankind which is coeval with the up thrust of the Himalayas. But before attempting it is required to castoff some myths and misunderstandings in history created by the westerners. These are:

1. That the Ape-like creatures developed enough intelligence to make stone implements for cutting up animals they have killed, thus marking the transition to primitive man and human civilizations and cultures began in Holocene period only, i.e. ten thousand years ago.
2. That the Egyptian, Mesopotamian, Indian and all ancient civilizations/cultures should be dated within four millennia before the birth of Christ. Now, the knowledge has progressed much and several other sciences have pushed back the date of the origin of man by millions of years but the archaeologists cling to the old notion.
3. That the human history revolves around tool-making and search, production and storage of food (i.e. hunting, gathering, domestication of plants and animals for food) and evolving in this way the man reached the nuclear age.
4. That the humanity is divided into four races of which some are higher and some inferior intellectually as well as biologically.
5. Considering all this the Western intellectual cynicism[14] should stop interpreting archaeological findings in terms of 'one-way' movement of human beings from Eastern Europe or Central Asia with the sole mission to invade India via Iran.
6. It should also stop search for the 'Original Home of the Indo-Aryans', a people that never existed.

ANTIQUITY AND EARLY HISTORY OF MAN

Modern Science on Antiquity of Man

The Hindu scriptures specifically say that man was born about 120 million years ago in the Himalayan region. Before we give some other details it seems necessary to point out the changing views of western scientists on the time of the emergence of man on this planet. The archaeologists used to fix the antiquity of man to about 1 million years during the sixties of the last century but by its end they evolved it to about four to four and a half million years. On the other hand scholars of some other disciplines have arrived at higher dates for it. For example the noted historian Arnold J. Toynbee unhesitatingly states "Man would have been in existence for about twenty million to twenty-five million years by now."[15] On the other hand the biological science accepts it to be 75 million years. Asimov writes

> "When biochemists developed techniques for determining the precise amino acid structure of proteins, in 1950s, this method of arranging species according to protein structure was vastly sharpened. ...In 1965, even more detailed studies were reported on the hemoglobin molecules of various types of primates, including man. Of the two kinds of peptide chains in hemoglobin, one, the 'alpha chain', varied considerably. Between a particular primate and man there were only six differences in the amino acids and the alpha chain, but twenty-three in those of the beta chains. Judging by differences in the hemoglobin molecules, it is believed man diverged from the other apes about 75 million years ago, or just about the time the ancestral horse and donkeys diverged.[16]

But the most astonishing part of this progress is that all ancient civilizations are still dated within ten thousand years of Holocene.

We can hope that with the advancement of science the time for the emergence of man may reach Paurāṇic statistics but even 75 million years will not effect our scheme because according to geologists "The Himalayas as great mountains came into existence not more than 65-70 million years ago, though the rocks that make them up had undergone tectonic deformation in some earlier times as well."[17] But, the time factor should not hamper our understanding of early history of mankind as revealed by the Vedic and Paurāṇic literature.

PAURĀṆIK VIEW

Ilā the First Dynast and Daughter of Manu

All the Purāṇas agree that the present species of man emerged with Manu, the son of Vivasvat. According to the *Bhāgavata Purāṇa*[18] he was issueless

and his priest Vasiṣṭha performed a *yajña* of 'Mitrāvaruṇa' for the purpose. But the first issue happened to be a daughter who was named Ilā. Manu, not very happy with this,[19] complained to Vasiṣṭha who got the sex of Ilā changed through the blessings of Viṣṇu and was renamed as Sudyumna. Once the latter, while on hunting, unknowingly entered the realm of Umā and Śiva, and was reconverted to a female; and thus again became Ilā. In the meanwhile she married Budha, the son of Soma and became pregnant. However she pleased Śiva and Umā and was blessed to be man for a certain period and woman for another; and that will not have remembrance of the period of the other sex. Ilā in the form of Sudyumna begot three sons, and, as Ilā begot one son named Purūravas who was the progenitor of majority of royal families of Bhārata.

However, we can sidetrack the question if the epicene Ilā could procreate children? And if so, was the earliest man epicene? We cannot answer these questions and may leave the question to be seen by the future scientists of fast growing genetic engineering. We should believe in the Pauranic accounts and at present can do no better than to believe it. However, there were about seven royal families that sprang from Ilā that flourished in Jambudvīpa including Bhārata while only three are known from the nine sons of Manu.[20]

TRADITION SUPPORTS

This is not my imagination that humanity originated at Sumeru or Pamir region. There are some references about this. The *Mahābhārata* states: "There is Meru in the centre of world famous sacred Himalayas, which is one *yojana* wide and five *yojanas* long, where all were born."[21] *Rāmāyaṇa* of Vālmīki says that when men were born all were of one *varṇa* (class) and used one language.[22]

The Nucleic Region Pamir

We have already noted the nine segments of Jambudvīpa with the Ilāvṛitavarsh on Pamir in the centre. The human history, at least the early part of it is mostly centred around Ilā, the first dynast, and her descendents who are said to be the rulers of Ilāvṛtvarsha on Meru or Pamir. Without going into the details of the story of Ilā and Budha and the alternate change of her sex we note sites of some early happenings around the Meru or the Pamir region. The forest where Umā and Śiva were dallying when Sudyumna (the male Ilā) entered must have been situated somewhere near Meru. The *Matsyapurāṇa* calls it Śaravaṇa[23] while according to Vāyupurāka[24] its name was Umāvana. It assumes chronological significance when we

recall that Umā was the first consort of Śiva and, as the story goes, she had demolished herself during the sacrifice of her father Daksha.[25] In the next incarnation she was born as Pārvatī as the daughter of Parvatarāja Himavanta. Thus the story of Ilā must be the earlier episode when the Kailāsa on Himalayas became the abode of Śiva. The tradition relates that Meru was the first mountain to emerge and the Himalayas came later in the process. The historical tradition also relates that the kingdom of Ilā, known as Ilāvṛitavarsha, was situated on the Meru, i.e. Pamir; later called Kamboja by Pāṇini. It is important to note that the *Rāmāyaṇa* of Vālmīki knows Ilā as the king of Bāhlīka (Bāhlīśvara and Bāhlīkeśa), Balkha or Bactria.[26]

We know from the *Viṣṇupurāṇa*[27] about the nine *varshas* of Jambudvīpa with Ilāvṛitavarsha (on Meru or Pamir) in the centre. At present it is not possible to clearly demarcate the boundaries of these nine *varshas*, because the regions since then have undergone a number of political changes; but at the same time it is not difficult to roughly estimate their locality from the sequence given above.

It is also of no use to go into the names of the mountains and sub-mountains given in the *Purāṇas* because it is not possible to exactly locate them, but the names of at least two rivers are interesting. The west going river issuing from Meru (Pamir) was Chakshu (or Vakshu) that passes through Ketumālavarsha to meet the (north) sea.[28] This is well identified with the river Oxus or Amu Darya. The river issued from Meru going northwards is named Bhadrā that passes through northern mountains and the Uttara-Kuruvarsha region to meet the North Sea.[29] This may possibly be identified with the Syr Darya. At present both the rivers fall in the Aral Sea.

It is also of little use here to relate the history of Ilā and her son Pūruravā and the following kings such as Āyu, Nhusha, Yayāti, Puru and his five brothers because it is well known and also is not of much relevance for our discussion here.

A TRADE ROUTE THAT CONNECTED INDIA WITH EUROPE

In later historical period some Indian and Greek literary sources speak of a northern trade route called Uttara-Patha that connected eastern coast of India to Europe through Gandhāra and Bactria. This breaks the image of India projected by Western historians that India was a secluded region cut off from rest of the world.

The Northern Route

Agrawala, on the evidence of Pāṇini (V.1.77) notes "The Uttarapatha may be identified with the ancient highway from east India to Gandhāra and

thence towards farther west. The entire Grand Trunk Road within India and as far as the Oxus, was well known to the Greeks as 'Northern Route', a literal rendering of Uttarapatha.

> Its Oxo-Caspian portion from India to the West by the Oxus and the Caspian is mentioned by Strabo (II. 73; XI. 509) and Pliny (Tarn, *The Greeks in Bactria and India*, p. 488, Appendix 14). 'Strabo, speaking of the Oxus, states (XI. 509) that it formed a link in an important chain along which Indian goods were carried to Europe by way of the Caspian and the Black Seas. He cites as one of his authorities Patrocles, who was an admiral in the service of Antiochus I, and thus makes it clear that the route was a popular one early in the 3rd century BC.' (*Cambridge History of India*, Vol. I, p. 433). Strabo also wrote that 'The Oxus is sufficiently navigable for the Indian trade to be carried across to it and to be easily beyond as far as the Black Sea by way of rivers.' (Tarn, op. cit., p. 489).[30]

This literary evidence of regular contact of Indians with the Oxus region and beyond up to Europe combined with the evidence of Puru/Kuru history in the region is helpful in interpreting the archaeological data provided by excavators and interpreters.

Dāsas, Dasyus and Paṇis

In later Sanskrit literature Dāsas and Dasyus have different connotation but in the *Ṛgveda* they are normally depicted as a people mentioned with the Aryas. It is prayed that Indra should equally punish both of these.[31] Our Western scholars, who initiated Vedic studies, have depicted them as black skinned aborigines as opposed to the fair complexioned Aryas.[32] They are said to be *anās* (noseless?) and *mṛidhra-vāch* (one who uses contemptuous or hostile speech). Dāsas and Dasyus are nowhere specifically called *śiśnadevāî*. Since the history of Ilā dynasty covers a broader geographical region let us quote here Zimmer and Meyer, and Hillebrandt as noted by the authors of the *Vedic Index*. It says that

> Dāsa originally meant 'enemy' in general, later developing in Iran into the name of the Dahae of the Caspian steppes, and in India into a designation of the aborigines. On the other hand Hillebrandt argues that, as the Dāsas and the Paṇis are mentioned together, they must be deemed to be closely related tribes, identifying the Paṇis with the Parnians and the Dāsas of the Ṛgveda with the Dahae.

This interpretation, when viewed in the light of the Ṛigvedic dialogue between Saramā and Paṇis, widens the geographical horizon of the events and shifts us to the north of the Caspian Sea. It is noteworthy that the ṛṣis of

this hymn are 'Asura group of Paṇis' (पणि-असुर समूह) which is unusual. Some scholars have questioned this practice of Asuras being ṛṣis of a Vedic hymn.[33] I believe the venue of the dialogue was that region. There are reasons to believe the Dahae of Caspian steppe being the Ṛigvedic Dāsas because only in this light we can interpret the 'Sapta Puraî Śāradīya'[34] (as seven winter cities) fit for use in cold regions. These cities had 'ramparts' (*dehyaî*=smeared or plastered)[35] also. These features appear to be confirmed by archaeological remains as well. Very strong towns (like those made of iron) of the Dasyūs (*dasyūnpura āyasīî*) are well known.[36]

THE ARCHAEOLOGICAL EVIDENCE OF VEDIC CULTURE IN CENTRAL ASIA

Archaeologists have unearthed several sites in Central Asia to the north as well as to the south of the Caspian sea that reveal several features of Vedic culture (they call it Indo-'Aryan' and Indo-Iranian). These archaeological evidences have been interpreted in favour of Indo-European or Proto-Indo-European movements and presented as advancing towards India with their Vedic culture and that the early hymns of the *Ṛgveda* were composed in these areas. Now we can utilize the formation to confirm the history of Ilā and her descendents outlined above. This history explains the presence of the Vedic people in these regions. These archaeological sites are mostly cemeteries. It will be interesting to recall a passage from *Atharvaveda* for four types of funerals.

Four Types of Funerals in the Atharvaveda

The *Atharvaveda* gives following four types of funerals for the dead forefathers (*pitṛis*) who are called to receive havi.

ये निखाता ये परोप्ता ये दग्धा ये चोद्धिताः।

सर्वास्तानग्ने अवह पितध्न् हविषे अत्तवे।। अथर्व0 काण्ड 18। सूक्त 2। मंत्र 34

Here *nikhātā* means those bodies that are buried under the earth, *paroptā* is used for the bodies immersed in the water, *dagdhā* is for cremation and *uddhitā* means to leave the dead body for natural consumption. Here all the four categories of the forefathers are called to come and accept the *havi*. In archaeological excavations mostly the fist category are met with. The *Ṛgveda* alludes to the burial after death and raising earth (or making *stūpa*) over it.[37] In many cases ashes are also associated with burials. Several objects are buried with the bodily remains or ashes. In India *stūpas* over the relics of the Buddha are well known.

Stūpas on the pit burials in the north Caspian region are called *kurgan*. Bryant notes

> The Kurgan (Pit Grave) culture in the Pontic Caspian steppe (3500- 2800 BCE) evolved into the Hut Grave culture (2800-2000 BCE), which in turn was succeeded by the Timber Grave (Srubnaya) culture (2000-800 BCE) and the related Andronovo culture (1800-900 BCE), which covered an enormous area from south of the Urals, across Kazakhstan, and into southern Siberia.[38]

The most important feature of some of these burials is horse-drawn chariots. It is stated that in the early Andronovo burial site of Sintashta in the Kazakh steppes of the southern Urals 'a chariot with spoked wheels' was found which is dated to about 1700-1500 BCE.

> "Anthony notes that horses were often sacrificed in the mortuary rites of the Sintashta culture, which he attempts to correlate with a hymn from the Ṛgveda wherein a horse is offered to the gods. He specially draws attention to one burial that contained the corpse of a decapitated victim whose head had been replaced by that of a horse.[39]

In this he finds a parallel in the story of Dadhīchi (*Ṛgveda* I. 116.12 and 84.13) in which Indra taught Madhuvidyā to Dadhīci and asked him not to teach any body otherwise his head will be cut off. But Aśvins replaced his head by that a horse and compelled him to teach that science. On knowing this Indra beheaded Dadhīchi but in turn the Aśvins replaced his own head. Ed. Bryant's comment is interesting when he says

> Although, the context of this myth has nothing to do with burials or funeral rites, the attempt to correlate this story with the contents of a solitary grave does gives some indication of the paucity of evidence available to archaeologists in the quest for the Indo-Aryans.

He is true to some extent but European scholars are apt to such parallelisms. However, horse sacrifice is not unknown to Indian literature but it is curious that in the Sintashta culture it is associated with the human sacrifice.

Some of these archaeological remains tend to show Vedic affiliations as gleaned by the original excavators and/or interpreters. There is nothing new here except that context has changed with the assumption of the presence of Vedic people in these regions and we do not perceive these people as the Indo-Europeans who migrated with their culture to India.

The Beshkent and Vakhsh cultures, mainly known from their cemeteries, are situated in southern Tajikistan. Litvinsky and others have called it Indo- Iranian. The Beshkent cemeteries have ritual hearths (*yajña-kuṇḍas*) built in the graves and the *swastikas* were used to mark the site. In the Vakhsh cemeteries funeral pyres were lit around the grave of a leader.

A scholar notes "The sacred fires of India hold the key ... the existence of round and square hearths/alters in ancient India ... is identical with the phenomenon we find at the sites in the West Pamirs." Edwin Bryant cannot be supported when he comments, "...the Indian hearths being referred to are the gārhapatya and dakshiṇa fires, which are performed in sacrificial contexts that have nothing to do with burials."[40] It was Pūruravas who made three divisions of Agni, viz. *gārhapatya*, *āhavanīya* and *dakshiṇa*.[41] The *Ṛgveda* refers to oblations offered to Agni on funeral pyre. [42] Agni Jātavedas also is associated to the funeral rites.[43]

Some scholars see "a fusion of cultures between southern sedentary agriculturists from Bactria and Indo-Iranian steppe pastoralists from an Androvovo proto-type." Edwin Bryant informs "The original excavator of the site, Mandel'shtam, and more recent scholars such as Klejn have considered these graves to be of Indo-Aryans but unconnected to the Androvovo culture."[44]

The discovery of a pestle and mortar with a spout were found in the royal cemetery of Marlik in northern Iran has been interpreted as a *Śiva-liṅga* by Kurochkin. But it has been contested by the Europeanists on the plea that the *Śivaliṅgam* is "a pre-Indo-Aryan icon from India, which would have no connection with any hypothetical Indo-Aryans in northern Iran".[45] This is an 'age old' myth created by the Europeanists that *Śiva-liṅgam* is a 'pre-Indo-Aryan' having no archaeological or literary support. A terracotta *liṅga*-cum-*yoni* is reported from Kalibangan (Mature Hrappan)[46] and one whole chapter of *Yajurveda* is devoted to Śiva.[47] We may ignore such cursory remarks based on age old assumptions.

The other issue is about hand-made versus wheel-made pottery. Bryant notes

> Those who do find reason to connect the trajectories of pottery with that of Indo-Aryans need to address one line of argument that will disqualify the Indo-Aryans from having any connection with wheel-made pottery at all. Wilhelm Rau has compiled the Vedic references to pottery from the oldest strands of the Black- Yajurveda and found that although the potter's wheel was known, it was hand made pottery that was prescribed for ritual sphere... Should this assumption be correct, 'we can pin down the transition from hand-made to wheel-made pottery, as far as the Aryans are concerned, (down) to the earliest phases of Vedic times?[48]

All this exercise of Rau 'of compiling the Vedic references to pottery' and to use it as unfailing missile to 'disqualify the Indo-Aryans from having any connection with wheel-made pottery' misfires when we find that the relics of the Buddha were deposited in a wheel-made pot. Hand-made

pottery is used in rituals even today in India for that purpose only. Beautiful images of Durgā and other deities are made by hand and coloured to be immersed soon after the rites are over. Same is the case Vedic rituals where hand-made pottery has extremely short life. For cemeteries wheel-made pottery is not prohibited as we find in the famous Piprahva *stūpa* of the Buddha containing his relics in wheel-made pottery. Therefore there is nothing that prevents Indo-Aryans from associating them with wheel-made pottery.

The Kurgan Culture: Marijas Gimbutas, the greatest advocates of Kurgan culture of Uralic/ Volgan steppe region being homeland of the Indo-Europeans. Kurgan is a word used for barrow or stūpa in the Slavic. According to Marijas the Kurgan people were mounted warriors who first domesticated and used horse for martial purpose. They also knew about the wheeled chariot (*ratha*). She also perceives some gynocentric element in Kurgan culture. In the light of Ilā being the first dynast she may be right. The term *kurgan* itself reminds one of the Kuru people, the name that persisted in the memory for ancient graves. A parallel can be noticed in India also. *Stūpas* in the memory of the Buddha are well known. In the eastern Uttara Pradesh artificial *stūpas* are still raised in almost every village; not in memory of the Buddha but for local village deities. These are called 'thāna of Sammo-Māī' a transformation of the word 'samyak saṁBuddha'. Thus it is not entirely improbable if 'kurgan' be remnant of 'kuru-jan'. Incidentally there are two places named Kurgan on the map; one in Kazakhistan known as Taldy Kurgan and in the Russian Federation, called Kurgan. Here we are concerned with that in the Russian Federation.

Kurgan is a Pit Grave culture where horse and chariot (*ratha*) are special features. Besides Vedic and Purāṇik literature we have prehistoric paintings of spoke-wheel carts.

The Andronovo culture was scattered over a large area and pottery technique of which on many points 'are absolutely similar to those practised by the Vedic Aryans'. The other major distinction is the richness of the impressed decoration of the Andronovo pottery, whose geometrical designs include traiangle, meander, *swastika*, lozenge and herringbone. Vedic pottery is supposed to be plain.[49] This again is a wishful supposition. There is no dearth of decorated pottery in Indus Valley Civilization which is now considered as coeval and identical with Vedic Civilization.[50]

The BMAC Culture: The plains of the river Oxus or Amu Darya, called Bactria and the adjoining oasis region on the mouth of Murghab River in the south Turkmania, called Margiana are jointly called 'Bactria and Margiana'.

Archaeological Complex (BMAC) on account of similarity of culture discovered during archaeological excavations. It was first excavated by V. Sarianidi and his colleagues. They consider the whole complex specifically Indo-Aryan. The ash pits found on raised platforms in a circular temple at the site called Dashley-3 is of special interest. At this site also was found a shrine inside the fortress with an altar near the wall which was suggested to be a ceremonial centre or temple. Similarly at the sites of Togolok-21 and Gonur-1 have been reported a variety of altars where at least in two of them are found on microscopic analysis signs of intoxicating herbs. Some stone pestles and grinding stones found on the sites also confirm the suggestion. At the Gonur site some vessels are reported to contain remains of herbs like cannabis, ephedrine and poppy as well as ceramic stands and sieves for filtration of pressed herbs. There were also noticed some fire altars or signs of fire on the walls of some rooms. These are interpreted in terms of Vedic sacrifices.

It has also been emphasized that the BMAC culture was an urban one with fortified towns with temple complexes. At the Gonur site the fortress occupies about twenty-two hectares while temple is in two hectares with up to about four metres thick walls. This really must have been an urban centre with some sort of political power with several characteristics special to the Vedic culture.

The Bactria Margiana Archaeological Complex culture is dated between 2100 BC and 1750 BC coeval with the Harappan Civilization. In geographical expansion it covers almost entire northern Afghanistan and parts of southern Turkmenistan. As we have noted above this region was under the influence of the Vedic Civilization since the very beginning there is no wonder if several Vedic traits are found there. No one can expect the whole complex to be identical with the Harappan in every respect. We must permit local variations in practices but the essence is Vedic. This is supported by the discovery of seals with religious motifs similar to those found in the Mitanni kingdom. For easy communication of the ideas we may also call the BMAC Indo-'Aryan' but during last two centuries this term has acquired some special connotation and is defamed. Asko Parpola's thesis of conflict of two cultures and the so-called Aryans having pushed the Dāsas into India who again attacked them and pushed further may be rejected in the light of above discussion.

NOTES AND REFERENCES

1. *Viṣṇupurāṇa*, 2. 2. 7, 13-14 and 24.
2. न द्व्यचः प्राच्यभरतेषु। IV. 2. 113.

3. V.S. Agrawala, *India as Known to Pāṇini*, revised and enlarged 1963, Varanasi, p. 9.
4. *Ibid*., p. 59.
5. *Ibid*., pp. 55-56.
6. See B.N. Mukherjee, *The Concept of India*, Calcutta, 1998, p. 18.
7. T.P. Verma, 'They Claim Indians, Not Invaders: Yavanas, Śaka-Pahlavas, Kushāṇas and Hūṇas', *Itihas Darpana* XIII (1): 2008, pp. 90-100.
8. Cf. *Viṣṇupurāṇa*, 2.1.22 where the *varsha* to the north of Śṛingavāna mountain (i.e. Meru or Pamir) was given to Kuru, the son of Āgnīdhra, grandson of Priyavrata and great grandson of Svāyambuva Manu.
9. See *Brahmapurāṇa*, 27.60-62b; *Matsyapurāṇa*, 114.53-54b, and *Vāmanapurāṇa*, 13. 54-55.
10. A.A. Macdonell and A.B. Keith, *Vedic Index*, I, p. 84.
11. *Ibid*., p. 38.
12. V.S. Agrawala, *op. cit*., pp. 49-50.
13. *Ṛgveda*, X. 17. 1-2 of which is Saraṇyū is the Devatā. The narration is found in H.H. Wilson's translation, edited by Ravi Prakasha 'Arya' and K.L. Joshi, Delhi, Vol. IV, p. 230.
14. The idea has been picked up from Edwin Bryant, p. 45.
15. Arnold J. Toynbee, *Mankind and Mother Earth*, New York, 1976, p. 22, quoted by B. Poddar's *Viśva kī Kāla-Yātra*, New Delhi, 2000, p. 208.
16. *Guide to Science*, Vol. 2; *The Biological Sciences* by Asimove, pp. 335-36, Penguin Books, 1979; quoted in B. Poddar's *Viśva kī Kāla-Yātra*, p. 202.
17. S.M. Mathur, *Physical Geology of India*, New Delhi, 2002, p. 16.
18. *Bhagavata Purāṇa*, 9.1.12 ff.
19. However, Manu begot nine sons besides Ilā whose names are: Ikshvāku, Nābhāga, Dhṛishṭa, Śaryāti, Narishyanta, Prāṁśu, Nābhāgodishṭa, Karusha and Prashdhra. See F.E. Pargiter, *Ancient Indian Historical Tradition*, 1922/1972, p. 84, fn, 2.
20. See Pargiter's *Table of Royal Genealogies* on pp. 144-45 to pp. 148-49.
21. हिमालयाभिधानोऽयं ख्यातो लोकेषु पावनः। अर्धयोजनविस्तारः पञ्चयोजनमायतः।
परिमण्डलयोर्मध्ये मेरूरूत्तपर्वतः। ततः सर्वाः समुत्पन्ना वृत्यो द्विजसत्तम।। महाभारत ।। quoted in *Vaidika Sampatti*, pp. 256-57.
22. अमरेन्द्रमया बुद्ध्या प्रजाः सृष्टास्तथा प्रभो। एकवर्णाः समाभाषा एकरूपाश्च सर्वशः।। quoted in *Vaidika Sampatti*, p. 238.
23. *Matsya*, 11. 44-45.
24. *Vāyu*, 85. 27.
25. That the Dakshas were a northern people in Pāṇini's time, we have seen above in the description of Prof. V.S. Agrawala.
26. *Rāmāyaṇa*, VII. 87. 3 and 7.
27. *Viṣṇupurāṇa*, 2. 2. 16.
28. *Ibid*., 2. 2. 37.
29. *Ibid*., 2. 2. 38
30. V.S. Agrawala, *op. cit*., p. 244.

31. *Ṛgveda* 34. 6;VI. 22. 10; 33.3; 50.6; VII. 83. 1; X. 38. 3; 69. 6, etc.
32. *Vedic Index*, I, pp. 356 ff.
33. See the article by Viśvanātha Vedalaṅkāra in *Vedavāṇī*, Vol. IX, 1-2, Nov.-Dec. 1960, pp. 92-95.
34. *Ṛgveda* I. 131. 4; 174. 2; VI. 20. 10.
35. *Ṛgveda* VI. 47. 2.
36. *Ṛgveda* II. 20. 8.
37. *Ṛgveda*, X. 18. 10-13.
38. Edwin Bryant, *The Quest for the Origins of Vedic Culture*, Oxford, 2001, pp. 204-05.
39. *Ibid.*, p. 205.
40. *Ibid.*, p. 207.
41. *Viṣṇupurāṇa*, 4.6.78.
42. *Ṛgveda*, X. 14.13-15. Sūktas Nos. 15 and 16 also refer to Agni-saṁskāra to the dead.
43. *Ibid.*, X. 15. 12.
44. E. Bryant, *op. cit.*, p. 207.
45. *Ibid.*, p. 210.
46. B.B. Lal, *Sarasvatī Flows On: The Continuity of Indian Culture*, 2002, New Delhi, p. 118 and illustration No. 4.54.
47. *Yajurveda*, 16. 1-66.
48. *Ibid.*, p. 211.
49. *Ibid.*, p. 212.
50. See B.B. Lal's book *Sarasvatī Flows On: The Continuity of Indian Culture*, already referred. This work is a so far the most authentic exposition on the subject. In the light of its findings most of books written by Western scholars at the close of the last century on the so-called 'Aryan' movements need revision.

13

Mother Divinity: River Sarasvatī, Hindu Civilization Traditions and Metaphors Created by Ṛṣis and Artisans

S. Kalyanaraman

Hindu civilization has a unique metaphor: river as mother, river as divinity; Vedic river Sarasvatī as mother, as divinity. In many parts of India, the lingua franca phrase used for a river is: *nayi mā*, (mother river); in *Cāraṇa Sāhitya* (the songs of bards) of Rajasthan and northern India, the word used for a river is ambā (mother), evoking the Ṛgvedic phrase 'ambitame' (best of rivers). Ṛgveda also refers to river Sarasvatī in the following exquisite terms: *Sarasvatī saptathī sindhumātā* (Sarasvatī, the seventh, the mother river). The artisans of the civilization which was nurtured on the banks of the river depicted their life-activity of smithy through many metaphors derived from *mleccha* (meluhha) lingua franca in a linguistic area. A river is also depicted as a *kumbha* (sacred pot) as in *kumbhamela* held every 12 years in a confluence of Ganga, Yamuna and Sarasvatī rivers at Prayag.

A metaphor for Sarasvatī River is *kumbha*.



Fig. 1.

Fig. 1. Sarasvatī. The legend shown on Bhita sealing, together with a *ghaṭa*. Indian Museum, Calcutta, No. A. 11254-NS. 1958. The association of Sarasvatī with a *ghaṭa*, water-pot is significant and relates to river Sarasvatī.

An abiding tradition of Hindustan is the veneration of ancestors (*pitṛs*) by offering *pitṛ* and *mātṛ-tarpaṇam* on newmoon days. Thus, on *Āṣāḍha amāvāsya* day over 5 lakh pilgrims visit Rama-Setu in the Hindumahāsāgara (Indian ocean) to offer *Setutirtham* and to offer the *tarpaṇam*

remembering and venerating the ancestors starting from Maryādā Puruṣottama Sri Rama with this *sankalpa*: *Sri rama rama rameti vyapohati na samśayah*. Just as Gaya on the banks of river Ganga is venerated as *pitṛ-gaya*; Pṛthūdaka (Pehoa) on the banks of river Sarasvatī is venerated as *mātṛgaya*. Sri Balarama, the elder brother of Sri Krishna offers his homage at Pṛthūdaka during his *pariyātrā* from Dwaraka to Plakṣapraśravaṇa (the origin of river Sarasvatī in the Himalayan ranges at the foothills of Mt. Kailas, close to Manasarovar glaciers) – Rupin and Supin glaciers 20 km. north-west of Yamunotri.

The artisans of the civilization produced exquisite bronzes, apart from the well-known 'dancing girl' bronze sculpture.



Fig. 2.

Fig. 2. Bronze foot of a lady wearing a bronze anklet: Mohenjo-daro [After Fig. 5.11 in: D.P. Agrawal, 2000].

Fig. 3. The bronze statue of a woman wearing bangles and holding a small bowl in her right hand, Mohenjo-daro (DK 12728; Mackay, 1938: 274, pl. LXXIII, 9-11). The bronze statue was made using the lost-wax (cire perdue) technique which continues to be used even today in Swamimalai on the Kaveri River basin by Viśvakarma who make bronze *mūrtis* – an extraordinary example of the continuity of metallurgical tradition which was evidenced in Sarasvatī Civilization. The statue evokes the later-day tradition of *pāvai-vilakku*, a lady carrying a lamp in her hand, as an offering to the supreme divine.

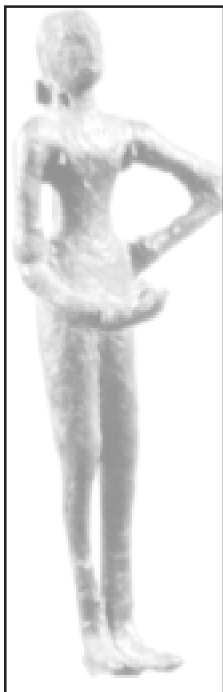


Fig. 3.

Ṛgveda Ṛṣi Gṛtsamada sees Sarasvatī in three forms: as a mother, as a river, and as a divinity, *ambitame, naditame, devitame*. The representation of female figure as a divinity continues in the days of Sarasvatī Civilization attested by many figurines and artefacts of the civilization.

The veneration of Sarasvatī as river and as *devi* occurs during *kumbhamela* which is held every 12 years at the confluence of Ganga-Yamuna-Sarasvatī at Prayagraj, Allahabad. This *mela* is the greatest pilgrimage on planet earth. The solar calendar of the month of *Māgha* (January-February), the newmoon day, and the planetary configurations when Jupiter is in Aries and both the Sun and the Moon are in Capricorn (*makara*) determine the days of sacred event. This *mela* is perhaps the world's largest gathering of pilgrims with over 70 million

gathering here to take a dip in the sacred waters of the *Triveni sangamam* (confluence of three rivers). Sarasvatī *puja* is held twice a year, once on *Vaiśakha pūrṇima* day and again a day prior to *Vijayadaśami* day during *Navarātri*. The Kumbha has been mentioned as a holy place for the performance of rites for the ancestors (*Vāyu Purāṇa* II.15.47), a place on the bank of Sarasvatī, where a holy bath is believed to bestow the benefit of *yajna* (fire-sacrifice) performance, (*Naradīya Purāṇa* II. 65.100). For Ganga, the most important *sangamam* points are at Haridwar, Prayag and the Gangasagar (*Matsya Purāṇa* 105-154; *Padma Purāṇa* III.43.546-555; *Brahmāṇḍa Purāṇa*, 77. 3). The cultural memory of Vedic river Sarasvatī is so intense and abiding that this is carried forward in the Ganga River basin as people move into this basin as the gradual desiccation of river Sarasvatī occurs between 2500 to 1900 BCE. The metaphor of *kumbha* is from the cultural memory of *samudramanthanam*, the churning of the ocean for aquatic riches. This indeed is a metaphor for a maritime-riverine civilization of the *pitṛs* (ancestors) of many Bhāratiyas.

Skanda Purāṇa describes the course of the Sarasvatī River. Sarasvatī issues from the water-pot of Brahmā (1.ii.56.13; 3.ii.25.1-7, 10-16, hence called *Brahmaṇahsutā*: 3.ii.25.7) and flows on a downward course from Plakṣa (7.1.33.40-41) on the Himalayas. At Kedāra, she turns west (*paścimābhimukhī*) and conceals herself underground (7.i.35.25,26). Beyond Pāpabhūmi, she reaches Gandharvakūpa and flows further on a westward course (7.i.26,27). Traversing through Bhūtīśvara and Rudrakoṭi before reachintg Śrikaṇṭha deśa (7.i.35,29-31; with its capital Sthāneśvara or Thanesar near Kurukṣetra), she reaches Kurukṣetra and flows on through Virāṭanagara, Gopīyanagari (near Virāṭanagara) and Devikṣetra, before reaching Paścima deśa (7.i.36.52). She then traverses the Kharjurīvana (where she is called Nandā), Mārkaṇḍāśrama, Arbudāraṇya, Vaṭavana, Vamśastamba, Kākatīrtha, Dhāreśvara, Puṇḍarīka, Mātṛīrtha, Anaraka, Sangameśvara, Koṭīśvara and Siddheśvara. She joins the Paścima Sāgara. (7.i.35.32-51). She is called Prācī Sarasvatī (5.i.57.31), Sāvitrī and Vedamātā (5.iii.3.10). As Vedamāta, she is the very personification of the Vedic culture. She is *Brāhmī mūrtih*, the incarnation of Brahmā and hence, sacred (5.iii.9.47). (A.B.L. Awasthi, 1965, *Studies in Skanda Purāṇa,* Pt. I, Lucknow, Kailash Prakashan, pp. 153-154).

Presiding deity of Vidyā-mandira established by Bhoja, the ruler of Paramāra dyanasty of Dhārā, Mālawa (who reigned from AD 1018-10060. The king is said to have founded a Sanskrit College within the temple dedicated to Sarasvatī). Now displayed as Stuart Bridge Collection (No.84); British Museum (Fig. 4). Paramāra, AD 1034 with a late nāgari inscription.


Fig. 4.

She is standing in *tribhanga* pose, is bejewelled; has four arms; a garland is held in her left upper hand and a manuscript is held in her left lower hand. Five *jīnas* are carved seated on the upper part of the black slab; an apparent indication that the image depicts the Jaina divinity of learning. On the base are two female attendants and a squatting worshipper on either side; to the right, a male and to the left, a female, perhaps representing the donors. The base of the image has an inscription in nāgari mentioning that it was made by the sculptor Manthala in AD 1034. She is stated to be the protectress of the sixth Tīrthānkara Padmaprabha. The eight anklets worn on her two ankles are reminiscent of the anklets worn by the bronze image unearthed in Mohenjo-daro dated ca. 2750 BC.

VĀK IS SARASVATĪ

Gopatha Brāhmaṇa (2.20) states that worship of Sarasvatī pleases Vāk, because Vāk is Sarasvatī: *atha yat Sarasvatīm yajati, vāg vai Sarasvatī vācam eva tena prīṇāti*. The very institution of the *yajña* itself which is identified with the divinities is also identified with Vāk [*TB* 1.3.4.5: *atho prajāpatāv eva yajñam pratiṣṭhāpayati prajāpatir hi vāk*; *TB* 16.5.16: *vāg vai sarasvatī vāg vairūpam vairūpam eva smai tayā yunakti*; Sāyaṇa's commentary: *Vāk śabdātmikā hi sarasvatī vairūpañca vāksamatutam*; Sarasvatī is speech in the form of sound (*śabda* or *dhvani*); the word 'rūpam' suggests a number of forms of speech; vairūpam is the object denoted by speech]. *Śatapatha Brāhmaṇa* states that Sarasvatī is speech and speech itself is sacrifice (*ŚB* 3.1.4.9,14). Sarasvān is identified with mind and Sarasvatī with Vāk. (*sārasvatau tvo tsau prāvatām iti mano vai sarasvān vāk sarasvaty etau*: (*ŚB* 7.5.1.31; 11.2.4.9, 6.3). Sarasvatī is pāviravā (*RV* 2.1.11; *AB* 3.37); this is interpreted as *śodhayitrī* or as purifying; or, as sound created by a spear or lance (*pavīra*) or Indra's thunderbolt (*pāviravi = āyudhavatī*). Sarasvatī's connection with the mind and the cow (beneficial yield) led her giving full inspiration (*dhī*) to compose hymns, and, consequently, she became the divinity of wisdom (J. Gonda, *Pūṣan and Sarasvatī*, p. 10; Book Review, *JRAS*, 1986, no. 1, pp. 120-21). In the *Brahmāṇḍa Purāṇa* (4.7.27), Sarasvatī is described as one of the nine *mātṛkas* accompanying Lalitā in her fight with Bhaṇḍāsura.

Fig. 5. Nausharo: female figurine. Period 1B, 2800-2600 BCE. 11.6 x 30.9 cm. (After Fig. 2.19, Kenoyer, 1998). Red paint showing *sindhur* at the parting of the hair; hair painted black; necklaces painted golden.



Fig. 5a.



Fig. 5b.

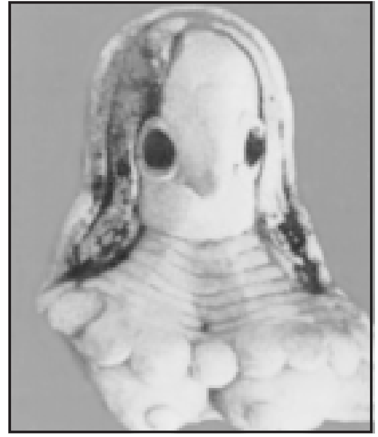


Fig. 5c.

> A journalist was sent by Romila to ask Prof. B.B. Lal: "You have shown the *gudiya* painted to show *sindhur* at the parting of the hair. It appears that the *gudiya* are Hindutva forgeries." B.B. Lal replied: "The excavator was a French archaeologist, Jean Paul Jarrige. The workers who discovered the *gudiya* were Pakistani workers at Nausharo. I don't think they are Hindu. Accept the fact that the *gudiya* show the continuity of Bharatiya Samskruti for the last 4500 years."

Fig. 6. A figurine from Mehrgarh, ca. 3000 BC. (Musèe Guimet, Paris).

Fig. 7. Mehrgarh figurine. http://www.razarumi.com/documents-archive/story-of-a-painting-mehrgarh-indus-and-ghalib/ Kabul Museum: Gallery B, #1 http://www.mythinglinks.org/eurasia_Afghanistan2.html. http://upload.wikimedia.org/wikipedia/en/thumb/c/c4/Mehrgarh_figurine3000bce.jpg/180px-Mehrgarh_figurine3000bce.jpg.

Fig. 8. River divinity from Begram. Ivory. 47 cm. tall. Kabul Museum. http://www.mythinglinks.org/eurasia_Afghanistan2.html

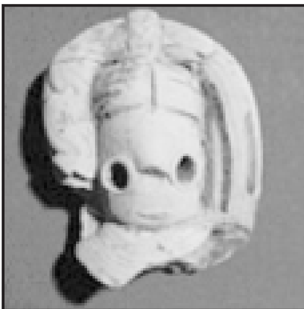


Fig. 6.

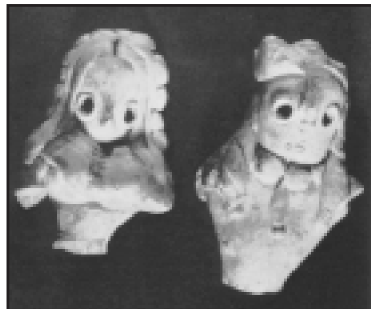


Fig. 7.

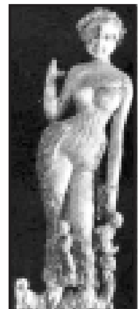


Fig. 8.

Fig. 9. Mother divinity. Zhob, Baluchistan.
Fig. 10. Mohenjo-daro. Divinity figurines. Mother divinity (fertility divinity), derived from the Indus Valley tradition, terracotta, Sar Dheri, Gandhara, 1st century BCE. http://en.wikipedia.org/wiki/User:PHG.
Fig. 11. Mother divinity figurines, right, from Mundigak, left, from Deh Morasi Ghundai, 3rd millennium BC (h. 5cm) http://www.afghanan.net/afghanistan/prehistory.htm.

Most of the raw materials used by the Harappan Civilization were available from not-too-distant sources: copper from Rajasthan, semiprecious stones from the region of the Narmada River and Badakhshan. Farther afield, gold may have come from the south of the peninsula; but as yet little research has been done on the nature of intra-Indian trade at this time. To the west of the Indus Plain, villages such as those revealed at Kulli and Nindowari continued to experience 'Indianization', though they retained their individuality, and may still have played a role in the diminishing overland trade. But the height of the civilization brings maritime commerce briefly into its own, as the fortified outpost at Sutkagen Dor on the Makran Coast shows. (Lothal in Saurashtra has frequently been cited as a port; but, since technical considerations precluded the large basin there [plate II.4, fig. 8] having served as a dock- yard, this identification lacks evidence.)

Fig. 12. Figurines from Kulli culture. http://sambali. blogspot.com/2005 01 10 sambali archive.html. Were such votive figurines kept in shrines? D. Bharadwaj, 1998. 'Investigating the archaeology of female figurines in north-west India (up to 200 BC)', M.Phil. dissertation. University of Delhi, p.34. See also: 'Exploring the Archaeology of Hinduism', author(s): Nayanjot Lahiri and Elisabeth A. Bacus. Source: *World Archaeology*, Vol. 36, No. 3. *The Archaeology of Hinduism* (Sep., 2004), pp. 313-325. Published by: Taylor & Francis, Ltd. http://www.jstor.org/stable/4128334.



Fig. 9.

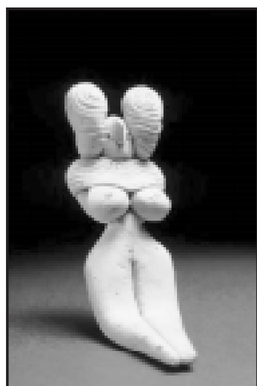


Fig. 10.

(Source: Schwartzberg Atlas, II.3) 'The cities of the Harappan Civilization' (Fig. 13) at this time represented the eastern limits of a Persian Gulf (Fig. 14) ecumene that also included southern Mesopotamia and Iran. But Indian bottoms reached the farther western shores only


Fig. 11a.


Fig. 11b.

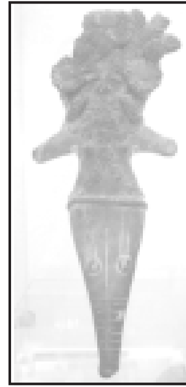
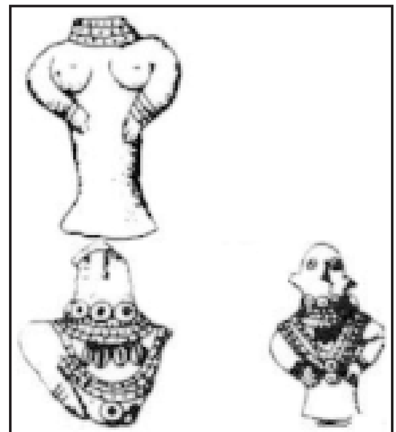

Fig. 11c.


Fig. 11d.

irregularly, if at all; for at the close of the 3d millennium BC. Oman and Bahrein (the 'Dilmun' of the Sumerians), achieved their greatest development as emporia. A vessel setting sail from a port of the Harappan Civilization is likely to have gone no farther than one or the other of these centres, from which their cargoes were then trans-shipped. Seals from the Persian Gulf trading centres faithfully reflect this intermediary role, for their quite distinctive appearance is the result of a skilful blend of both Mesopotamian and South Asian elements.

> The mechanics of trade within the ecumene are problematic. The overland aspect seems to have involved the transport of crude and semiprecious stones, carried perhaps in donkey cara- vans or, more simply, by porters. (Camel remains have been identified at Mohenjo-daro, but it is doubtful that this animal was yet domesticated.) The sketchy evidence for shipping shows only country craft. Whatever more seaworthy vessels there may have been would have been confined to coasting, for the sailor's challenge to the open seas in this region came some fifteen centuries later. The bulkier articles of trade were more profitably sent by sea than by land. The cities probably im- ported woolens in exchange for cotton by that route. Maritime contacts were short-lived, however; by the 19th century BC they came to a close as a result of dislocations in the west brought about by the movement of Indo-European-speaking peoples from Central Asia (*Schwartzberg Atlas*, V., p. 158).


Fig. 12.

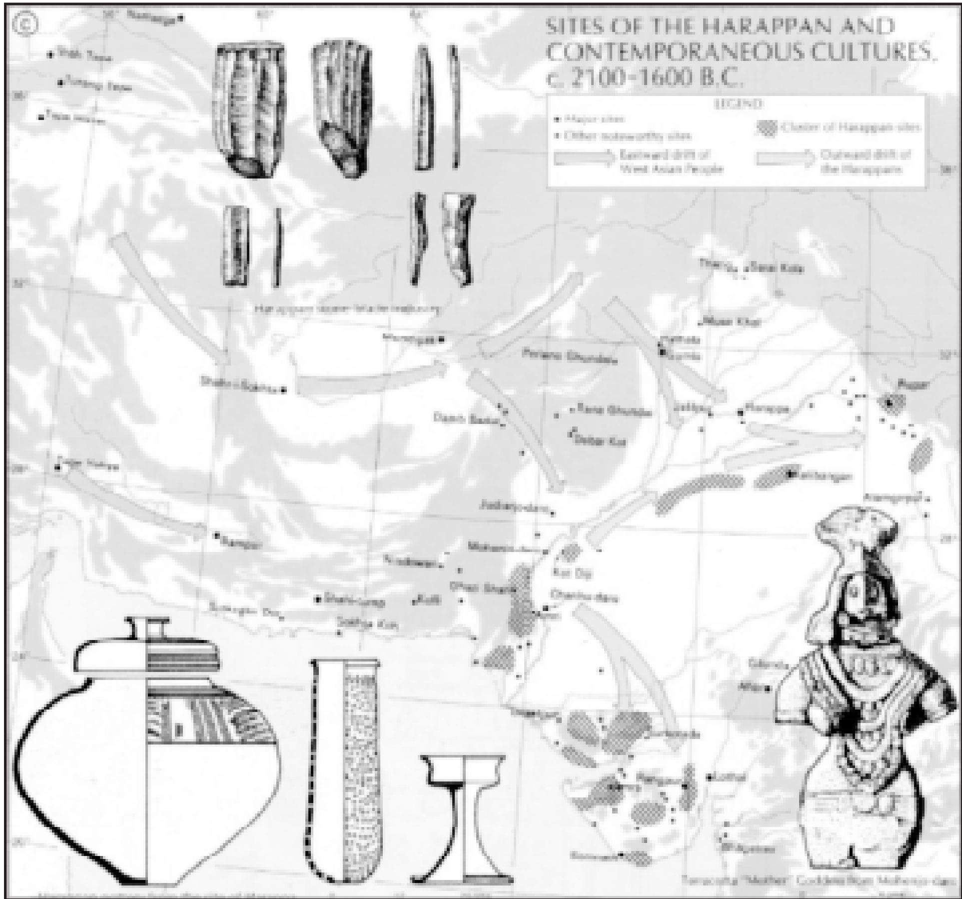


Fig. 13.

Culture de Nindowari. Cf: Les citès oublièes de l'Indus : Archeologie du Pakistan. Musèe National des Arts Asiatiques - Guimet, 1988. pp. 91-92. Statuette masculine. h. 10 cm. 2300 - 2000 BC (see Fig. 17). Torse de statuette fèminine h. 6,5 cm. 2300 - 2000 BC.

Fig. 15. Statuette fèminine. h. 5,5 cm. 2300 - 2000 BC.

http://www.aaoarts.com/asie/indus/indus.html.

Fig. 16. An Indus Valley clay figurine in the form of a female deity. Nindowari Item Code: x164 Description: An Indus Valley clay figurine in the form of a female deity. Origin: Kulli phase, ca. 2300-2000 BC. Nindowari culture. Dimensions: Height: 83 mm http://ww.bcgalleries.com.au/antiquities/viewItem/x164.

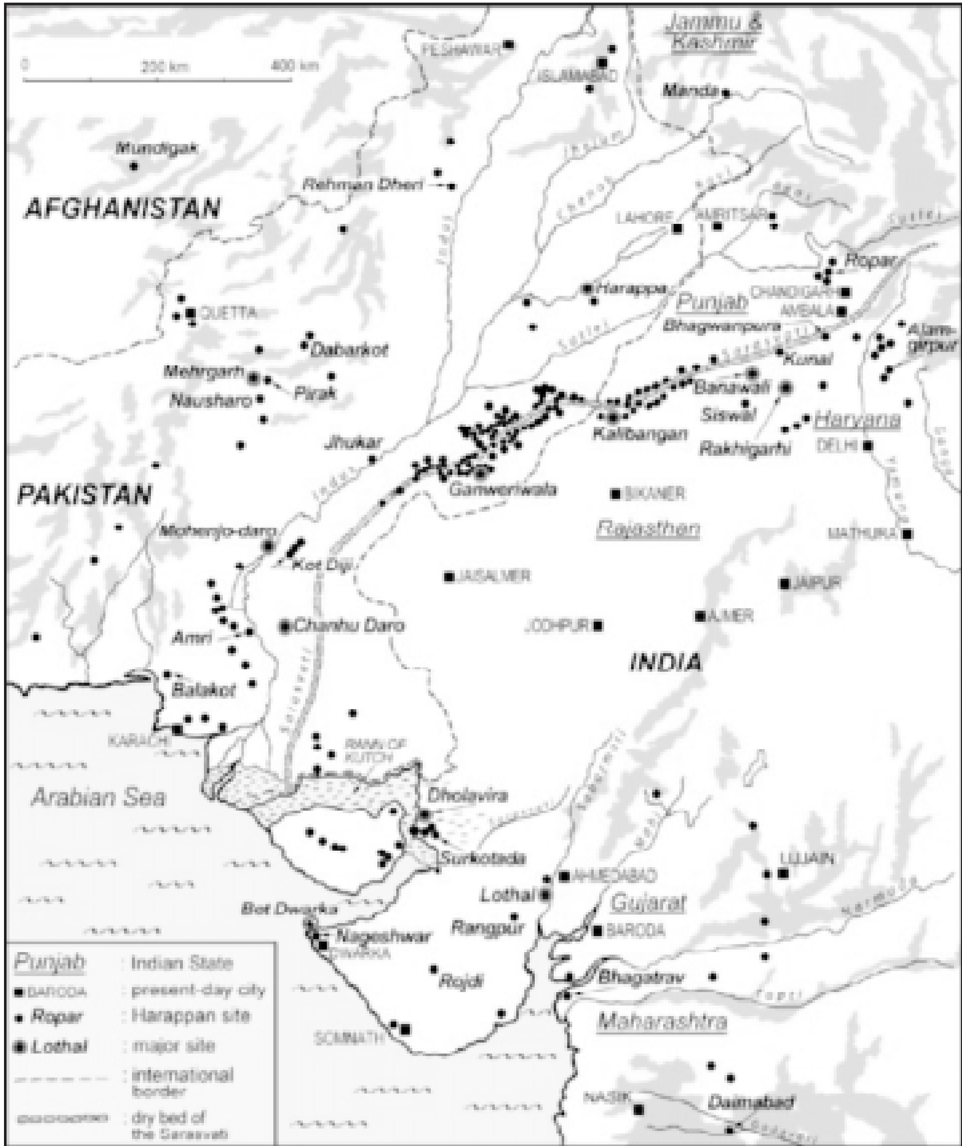


Fig. 14.

Jiroft object on the right shows a woman ligatured to a scorpion with dotted circles. Bicā 'scorpion' (A.) Rebus: *bali bica* 'iron sand ore' (Mu.).

Kudurru (boundary stone) marking of Nebuchadnezzar I (1126-1050 BCE), marking the king's land grant to Ritti-Marduk for military service in the inscription (not shown) (Fig. 18). The symbols appear in six registers. The first register is the eight-pointed star of Ishtar, the crescent of Sin and

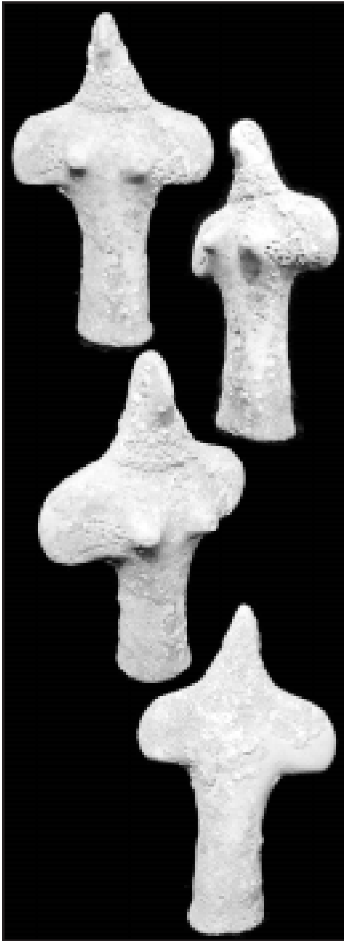
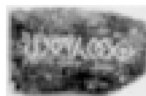
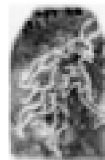


Fig. 15.

the sun-disk of Shamash. The second register represents the shrines of Anu, Enlil, and Ea. The third register consists of serpent daises upon which are the hoe of Marduk, the wedge of Nabu, and an unidentified symbol. The fourth register includes an eagle-headed scepter, a double-lion-headed mace, a horse's head on a double base with an arch, and a bird on a rod. The fifth register shows the Goddess Gula seated on a throne, with a dog (her symbol) lying beside her, and a scorpion-man, with the legs and feet of a bird, holding a bow and arrow. The last register includes double lightning forks supported by a bull (*adad*), a tortoise, a scorpion, and a lamp on a pedestal (the symbol of Nusku, the god of light). A snake twists along the side of the Kudurru. Ht. 56 cm. London, British Museum (After the notes in: Karen Rhea Nemet-Nejat, 1998, *Daily life in Ancient Mesopotamia*, London, Greenwood Press, p. 262). The 'star' sign denoted AN, sky god and also was the cuneiform sign to represent the word and syllable: AN. Many of these logographs are found among the Harappan glyphs. It is notable that the pictorial motifs are associated with weapons.



m0582At



m0582Bt



Fig. 16.

Many copper plate epigraphs of Sarasvatī Civilization also depict an archer.

Explaining the imagering of scorpion-man.

Bica-scorpion. Rebus: *bica* 'iron sand ore' (Mundari).

kāmaṭhiyo a bowman; an archer (Skt.lex.); *kāmṭhi*, *kāmaṭhum* [Skt. *kamaṭha* a tortoise, a bamboo] a bow (G.lex.) Rebus: *kamaṭa* = a

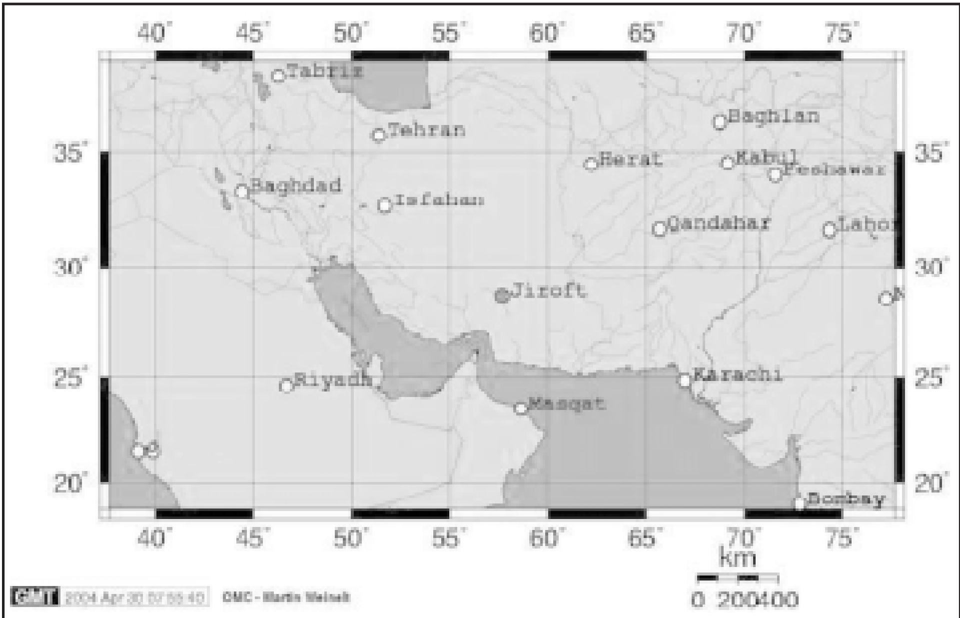


Fig. 17.



Fig. 18.



Fig. 19.

portable furnace for melting precious metals (Te.); *kamaṭhāyo* = a learned carpenter or mason, working on scientific principles (G.); *kammaṭīḍu* = a goldsmith, a silversmith (Te.); *kampaṭṭam* = mint (Ta.); *baṭa* = paddy bird (Telugu); *baṭa* 'quail' (Santali). Rebus: *baṭa* 'furnace' *baṭhi* = smelting furnace (Hindi Santali); *bhrāṣṭra* id (Sanskrit); *kuṭi* 'tree'; *kuṭhāra* (Skt.); *kuṭhi* = the pubes (lower down than paṇḍe) (Santali.lex.) *bicā* 'scorpion' (A.)

Fig. 20. Cylinder-seal impression from Ur showing a squatting female. L. Legrain, 1936, Ur excavations, Vol. 3, *Archaic Seal Impressions*.

Fig. 21. Terracotta vase painted with a frieze of humpbacked bulls and vegetal motifs. From Harappa, Indus Valley, Nindowari culture, 2300-2000 BC. In good condition with a minor repair and a small chip. H:12cm. Diameter: 14cm. http://www.trocadero.com/xanthos/items/690183 item690183store.html#item.

In these images, the bull is *bail*, *balīvarda* (Skt.); rebus: *bali, bali, bica* 'iron sand ore'. The ficus leaves are 'loa' (Santali); rebus: *loha* 'metal'.

Pleiades are *Saptamātruka* (seven mothers) in the Hindu tradition.

Bahulā 'pleiades' (Skt.); *bagalā* 'name of a certain female divinity' (Te.). Rebus: *bagaṛao* 'adj. mixture of different varieties' (Mu.); *bagaḍavum* 'to be adulterated' (G.) [alloy?]; *bangala* 'chafing dish, a goldsmith's portable furnace' (Te.).

The six or seven ladies on an Indus seal. A seal from Mohenjo-daro, excavation number DK 6847, now in the National Museum of Pakistan, Karachi. Copyrighted photo by the Department of Archaeology and Museums, Government of Pakistan (Figs. 22, 23).

A seal from Mohenjo-daro, excavation number HR 4161, now in the National Museum of India, New Delhi (Fig. 23).

On one side of this moulded tablet found at Harappa, a woman is shown holding back two jackals (tigers?) (Fig. 24).

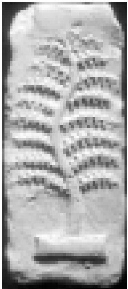




Fig. 20.

Fig. 21.



Fig. 22.



Fig. 23.

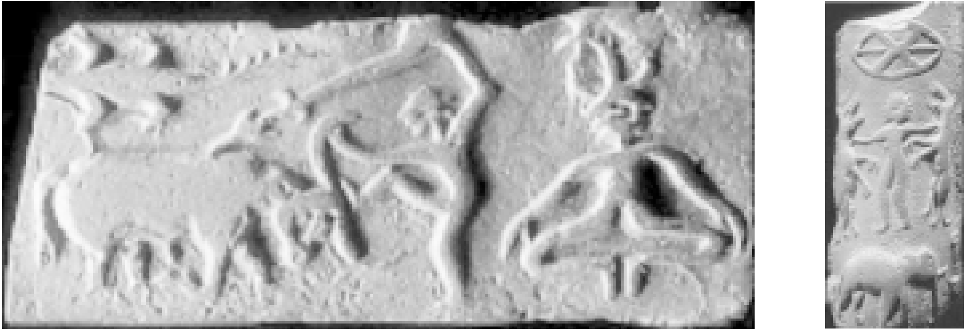


Fig. 24.

m0308AC Pict-105: Person grappling with two tigers standing on either side of him and rearing on their hindlegs. 2075 [The third sign from left may be a stylized 'standard device'?] (Fig. 25).

> In the mid 1980s CE, Ruth Hestrin, a curator at the Israel Museum, Jerusalem, pointed out, after examining a ceremonial vase excavated in Lachish, that in Israelite iconography *both the tree and the downward-pointing triangle* are not just symbols of, *but are literally interchangeable with, the Divinity Asherah*. Many Israelite artefacts show either a tree or a downward-pointing triangle with two lions (or other animals) on either side. These were understood by the Israelites as being the Divinity Asherah ('the Lion Lady') accompanied by her animals.

http://medusacoils.blogspot.com/2007_04_01_archive.html (Fig. 26).



Fig. 25.

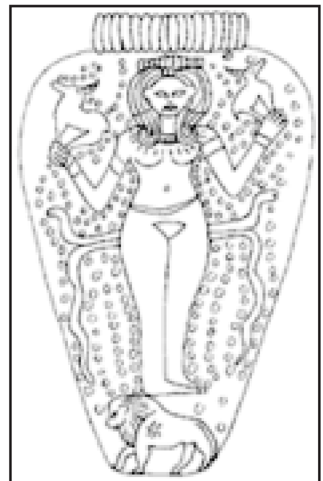


Fig. 26.

A ligatured tiger (ligaturing a woman to a tiger) is a 'rosetta stone' which unravels a Sarasvatī hieroglyph which can be explained in relation to a smithy.

Fig. 27. A terracotta object combining human and animal features was discovered at Harappa. http://www.harappa.com/indus/88.html.

This slide shows a seated left is a seated animal figurine with female head. Kenoyer comments:

> The manner of sitting suggests that this may be a feline, and a hole in the base indicates that it would have been raised on a stick as a standard or puppet. The head is identical to those seen on female figurines with a fan shaped headdress and two cup shaped side pieces. The choker with pendant beads is also common on female figurines.

Material: terra cotta. Dimensions: 7.1 cm height, 4.8 cm length, 3.5 cm width Harappa, 2384 Harappa Museum, HM 2082 Vats 1940: 300, pl. LXXVII, 67.

Tiger glyph is ligatured to a woman's body and also to the face of an eagle (Fig. 29). Both ligatured glyphs are hieroglyphs of mleccha. Both constitute 'rosetta stones' of mleccha to help decipher the Indus script composed of Sarasvatī hieroglyphs. Kola, kolum 'jackal' (G.); *vikalpa* glyphs: *kola* 'woman' (Nahali); *kolā* 'flying fish' (Ta.). Rebus: kolla 'furnace'(Te.); *kola* 'pancaloha or alloy of five metals' (Tamil); kolame, kolme 'smithy' (Ka.).

When a smith, Viśvakarma has to be denoted, the glyph is tiger turning its head backwards. The rebus word is: *krammara* 'turn one's head back' (Telugu); rebus: *kamar* 'smith' (Santali); *karmāra* (Vedic). Thus, the message conveyed by the glyph is: kol 'pancaloha, alloy of five metals'; *kamar* 'smith' (Santali); that is, *pañcaloha kammara* meaning: 'metal-alloy-smith'.

Fig. 28. Inscribed objects from Harappa 2000-2001 (Jonathan Mark Kenoyer and Richard H. Meadow). Slide 185; Molded terracotta tablet



Fig. 27.

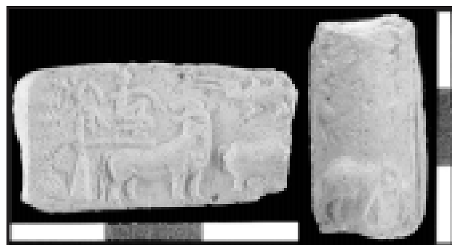
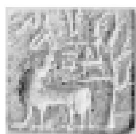


Fig. 28.



Fig. 29.

(H2001-5075/2922-01) with a narrative scene of a man in a tree with a tiger looking back over its shoulder.

 m0310AC 1355 *krammara* = to turn, return (Telugu); *krammarilu, krammarillu, krammarabaḍu* = to turn, return, to go back; *krammaru* = again; *krammarincu* = to turn or send back (Telugu); *kramaṇa* = act of walking or going (Gujarati); *karma* = step, series (AV); kramēṇa by degrees (Ramayana); *kama* = step, way (Pali); foot, series (Pkt.); *-krem in oi-n-krem* and *ū-krem* = upper and lower teeth (Wg.); *krem* = the back (Khotanese) (CDIAL 2776); *parikamā* = behind the shoulder (Ash.)(CDIAL 7799); *kamak* = back (Sang.); *com* = back of an animal (Shgh.); *kama* = neck (Yghn.)(CDIAL 14356).

Another rebus word is: *pasra* 'smithy'. *Pasra* = a smithy, a place where a blacksmith works; to do a blacksmith's work; *kamar pasrat hene sen akantalea* = our man has gone to the smithy; *pasrao lagao* (or *ehop*) *akata* = he (the blacksmith) has started his work (Santali); *pasra* (Mundari) (Santali.lex.Bodding); *pasra, pasāra* (Sad.; or. pasrā, a blacksmith's implements) = a blacksmith's forge; the place where a brazier (*ṭenṭera*, *malaṛa*) makes his bowls, armlets; *ne pāl ṭapuakana pasarate idime* = this ploughshare is blunt, take it to the smithy; the set of a blacksmith working in his forge; *pasrao* = of the blacksmith's work in the forge; *panasra* = the length of a blacksmith's work n the forge; *pasraili* = rice beer offered for sale; *pasra meṛed, pasāra meṛed* = syn. of *koṭe meṛed* = forged iron, in contrast to *dul meṛed*, cast iron (Mundari.lex.)

Pañjāva, pañjāvā = brick kiln (P.); *pāñjā* kiln (B.); *pajāvo* (G.)(CDIAL 7686); *payān* = potter's kiln (B.) (CDIAL 8023); *pajāvo* = a kiln; cf. *pacāvavum*, to digest in the stomach (G.lex.); *pācarai* = *pāṭi vīṭu*, i.e. town house or army house (*Puranā*.)

Thus, when a group of animals is represented as a composite pictorial motifs, the intention is to depict a smithy, while individual animals relate to specific property items of the smithy: furnace types, minerals, metals or alloys.

A smithy or a kiln could also be depicted by the following glyphs and read rebus: The ligature on the Nal pot ca. 2800 BCE (Baluchisan: first settlement in southeastern Baluchistan was in the 4th millennium BCE) is extraordinary: an eagle's head is ligatured to the body of a tiger. In BMAC area, the 'eagle' is a recurrent motif on seals. Ute Franke-Vogt:

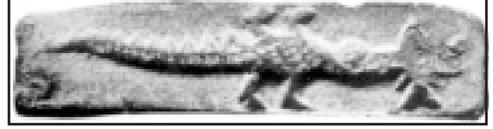


Fig. 30.

Different pottery styles link this area also to central and northern Balochistan, and after about 2900/ 2800 BCE to southern Sindh where, at this time, the Indus Civilization took shape. The Nal pottery with its particular geometric and figurative patterns painted in blue, yellow, red and turquoise after firing is among the earliest and most dominanstyles in the south.

Another metaphor for depicting a blacksmith is: *kaulo mengro* 'blacksmith' (Gypsy) pictured in aglyptic ligature: alligator + fish (*mangar* + *kola*) (Fig. 30).

Pajhaṛ = the Indian tawny, the Indian black eagle, the Indian crested hawk; eagle, *buru pajhar*, the hill-eagle, aquila imperialis; *hako saṭi pajhar* = a fish-eating eagle (also called *dak pajhar*); *huru pajhaṛ* = the imperial eagle (Santali .lex.); *panji-il* = a certain feather in each wing of a vulture (Mundari .lex.). [See the hieroglyph of an eagle ligatured to a tiger on a Nal pot. *Kol* is *pañcaloha*, alloy of five metals (Tamil); *kollan* 'smith' (Tamil); rebus *kol* 'tiger' (Santali)].

Pajhaṛ = to sprout from a root; *pagra* = a cutting of sugarcane used for planting (Santali .lex.).



Fig. 31a.

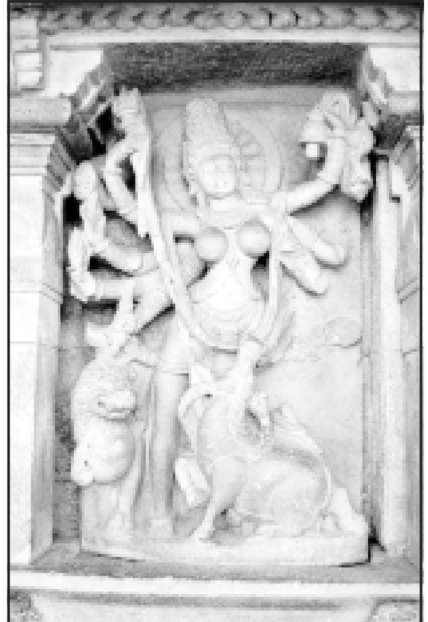


Fig. 31b.

The early metaphors relating woman (*kola*) to a furnace (*kolla*) or tiger (*kola*) to a smithy (*pasra*) results in a remarkable word kole.l which means "temple in Kota village"(Kota); *kwalal* = Kota smithy (To.); kole.l = smithy (Kota). The smiths, the artisans, of the viśvakarma tradition have identified a smithy as a temple. This may explain why the early *mūrtis* of Durga, the mother divinity, gets depicted with many metallic weapons (from the smithy).

Fig. 31. Divinity Durga killing the buffalo demon, Mahiṣa (Mahiṣasuramardini), Pala period, 12th century, Bangladesh or India, Argillite (1993.7). The objects in her left hands are a shield, bow, bell, mirror, and noose. Durga has just severed the buffalo's head with her many weapons.

Mahishasuramardini at Aihole. http://www.metmuseum.org/toah/hi/hi_rehi.htm http://www.flickr.com/photos/avrajyoti/785947828/in/set-72157600580484458/

Durga carries the following weapons on many sculptures:

cakra (disc), *pāśa* (noose), ankuśa, bow, arrow, *mūṣala* (club), *śakti* (spear), axe, *khetaka*, *vajra*, staff or sceptre (*yakṣam*), *bhusundī* (missile), *mudgara*. Her hands may also carry a flag, a lotus, a plough, a mirror, a *kamaṇḍalu* (water-pot), honey-cup, rosary (*akṣamālā*).

When depicted with only two hands, one of the hands may hold a *śūla* or *pāśa* weapon.

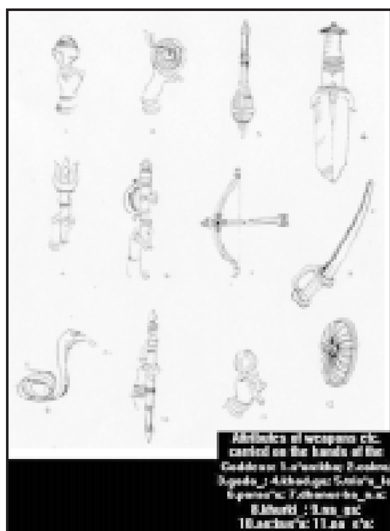




Plate X [c]. Liṅgam in situ in Trench Ai (MS Vats, 1940, *Excavations at Harappa*, Vol. II, Calcutta) (Fig. 32).
Śiva liṅga found at Harappa is shaped like the summit of Mt. Kailas (Fig. 33).
Śankha, *turbinella pyrum* a signature tune of Hindu Civilization; a species which occurs only in Hindumahāsāgar coastline.
Śankha wide bangle in a woman's burial
Śankha kṛśāna (*Ṛgveda, Atharvaveda*) – *śankha* (bowman), *śankha* (cutter).
A continuing, 8500 year-old industry.
At Tiruchendur (Kīẓakkarai, Gulf of Mannar), WB Handicrafts Dev. Corpn. has an office; annual turnover of *śankha* obtained: Rs. 50 crores.

Fig. 35. Burial ornaments made of shell and stone disc beads, and *turbinella pyrum* (sacred conch, *śankha*) bangle, Tomb MR3T.21, Mehrgarh, Period 1A, ca. 6500 BCE. The nearest source for this shell is Makran coast near Karachi, 500 km. South [After Fig. 2.10 in Kenoyer, 1998].

Fig. 36. *Turbinella pyrum* shell bangle manufacturing process [a to f]: preliminary chipping and removal of internal *columella*; [g to k]: sawing shell circlets; [l to n]: finishing the shell blank; [o]: final incising [After Fig. 5.23 in Kenoyer, 1998].

Yībhih kṛśānam asane duvasyathām javam yābhir yūnām arvanam āvatam madhupriyam bharathā yat suraḍbhyas tābhirū ṣu ūtibhir āśvanā gatam (*RV* 1.112.21). With those aids by which you defended Kṛśānu in battle, with which you succoured the horse of the young Purukutsa in speed, and by which you deliver the pleasant honey to the bees; with them, Aśvins, come willingly hither. [Kṛśānu are somapālas, vendors or providers of Soma; *hasta-suhasta- Kṛśānavah, te vah somakrayaṇah* (*Taittirīya Samhitā* 1.2.7); Kṛśānu = agni; Purukutsa was the son of Mandhātā and husband of Narmadā, the river; the text has only 'of the young', Purukutsa is added].



Fig. 32.



Fig. 33.



Fig. 34.

śankhah kṛśānah = pearl shell won from the ocean and worn as an amulet (*AV* 4.10.1). It is amazing that the *śankha*-cutters are the *Soma*-buyers as noted by *Taittirīya* S. – the sea-faring merchants of Meluhha.

Fig. 34. A skilled sawyer and shells ready for sawing, Calcutta.

The continuing traditions of *śankha*, veneration of female divinity and use of the same word, kole.l for a smithy and also a temple, may perhaps explain the sculptural depiction of *mūrtis* with many metallic weapons coming out of a smithy. The weapons themselves assume divine dimensions in an *āyudhapuruṣa* in Hindu traditions. Durga as Mahiṣāsuramardini gets depicted with multiple arms carrying many metallic weapons from the smithy, the temple: kole.l

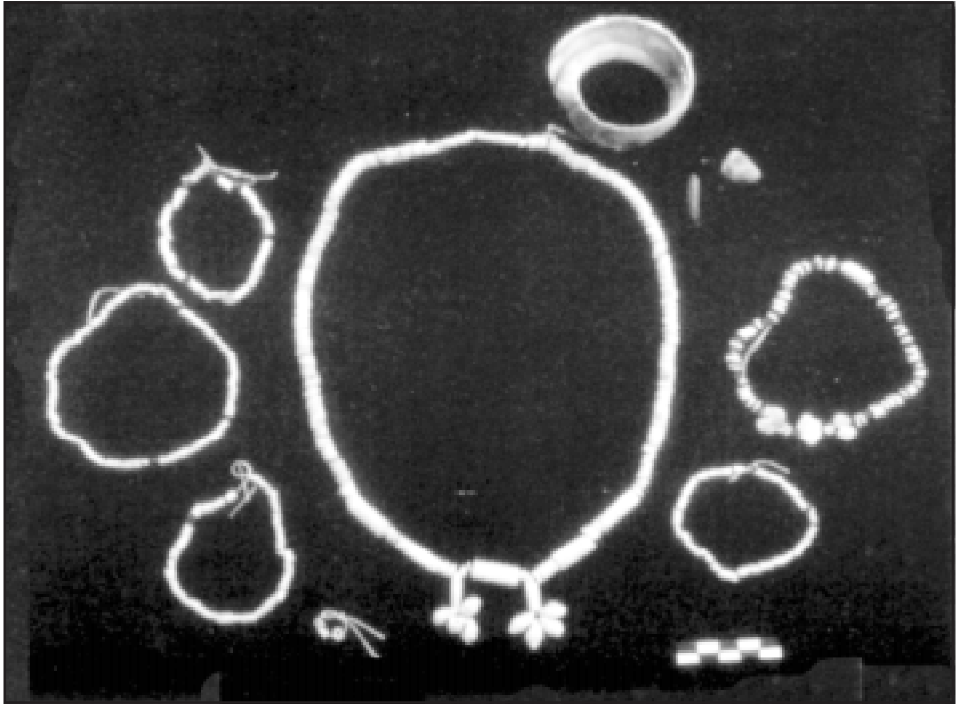


Fig. 35.

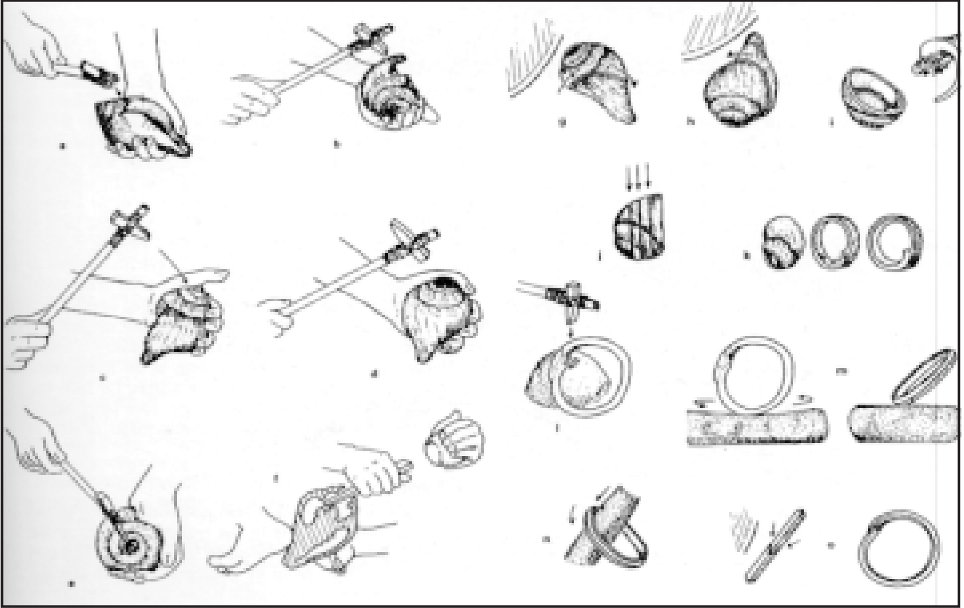


Fig. 36.

So is *svastika* a hieroglyph. It denotes *jasta*, *sattva* 'zinc' in the metallurgical tradition. It becomes an auspicious glyph related to a temple, smithy, kole.l (Kota language). *Svastika* glyphs are found in over 50 epigraphs of the civilization. *Svastika* is a Hindu Civilization metaphor of a metal which adds lustre to copper and makes it glittering brass, almost like gold. It is a metaphor of the cyclical motion of *kāla*, the *mahākāla*, the ceaseless apparent rotation of planets around the sun as the centre of the universe, in a cosmic dance, in a holding together, *dhāraṇa*, that is *dharma*, the cosmic order.

So it is that *śrivatsa* ligatured glyph becomes a metaphor for smithy, temple; so does a *stūpa* become a metaphor for *dhātugarbha*, temple remembering, paying homage to and venerating the ancestors, the *pitṛs*. http://Sarasvati97.blogspot.com/2008/06/mohenjodaro-mound-of-dead-stupa-as.html Mohenjodaro, mound of the dead; stupa as temple. http://www.scribd.com/doc/3475044/mohenjodaro.

Appendix

Hindu Civilization as Linguistic Area: Critique of Anthony's 2007 Book

Eurasian steppes as the crucible of civilization? Re-invent Indo-European. Study *mleccha vācas*. Study Indian linguistic area.

> — Book Review: Anthony's major study published in 2007, *The Horse, the Wheel, and Language: How Bronze-Age Riders from the Eurasian Steppes Shaped the Modern World*, Princeton University Press.

(a) Since it is the latest major study released in 2007, in the genre of 'Aryan Invasion/Migration Theories' though it presents the grasslands between Ukraine and Kazakhstan as the earliest crucible of civilization and (b) since it is so thoroughly documented, it deserves to be read and understood by researchers interested in the study of origins of civilization in Europe and Asia.

The book is a tour de force, very comprehensive in its search for roots of Proto-Indo-Europeans using the wheel, the horse and related language terms as the basis for the search.

It is rarely that a book with pretensions to unravel the roots of Indo-European languages based on a study of two phenomena – the horse and the wheel – can provoke a fresh look at language studies. Anthony's is such a book merely because it is so well-researched and so well-documented. Surely, a class act to be emulated as new studies of the Indian linguistic area evolve.

I read through, in one setting, the 553-page book by David W. Anthony which claims to document how bronze-age riders from the Eurasian steppes shaped the modern world. I couldn't put it down, so fascinating was the tale, which is sure to grip the imagination of any researcher engaged in the

study of civilization. I am thankful to Shri Rajiv Malhotra who pointed me to this work and the importance of *purvapaksha* (the other point of view) presentation in the quest for researches on 'Vedic River Sarasvati and Hindu Civilization' whichh is the theme of a Conference to be held in India International Centre between Oct. 24 to 26, 2008).

Rajiv Malhotra (personal communication) makes the following excellent points:

> A key point of his (Anthony's) work is that civilization's origins at a high stage of advancement are said to mature many millennia BEFORE the Vedic era. Notice that vedas are towards the END of the period he examines and not the beginning. He (Anthony) relies upon non-Indic evidences only to establish most of the story and THEN vedas, aryans and so forth enter the picture. This is a new approach from eurocentrics. Earlier they wanted to claim vedas. Now they are making vedas less relevant to the issue of origins by claiming that origins happened many millennia earlier anyway. By the time he treats vedas in his book the die has been cast.

Many leaps of faith occur in Anthony's book linking archaeological artefacts to language but the presentation of the archaeological evidence is very well analysed and documented, leaving one with a feeling of chasing an illusion.

The new point of view he presents is that invention of chariots of the spoked wheel in particular – and domestication of horses impacted the spread of language. He also notes that poetry was the only medium helping this spread of Proto-Indo-European through what he calls 'elite recruitment'. The suggestion is that apart from assuming a dominant position for their language to be picked up, the recruited 'elite' offered the local population chances to participate in their language culture. He also presents genetic analyses to suggest that domestication of all horses in the world may have come from different wild mothers, but sharing a single father.

The work is a veritable collage of the researches of historical linguists of European languages and archaeologists of Europe and the Middle East, while presenting the intricate details of the genealogy of history of Proto-Indo-European language. The announcement of the publication reads modestly as follows:

> Roughly half the world's population speaks languages derived from a shared linguistic source known as Proto-Indo-European. But who were the early speakers of this ancient mother tongue, and how did they manage to spread it around the globe? Until now their identity has remained a tantalizing mystery to linguists, archaeologists, and even Nazis seeking the roots of the Aryan race. The Horse, the Wheel, and Language lifts the veil that has long shrouded these original Indo-

> European speakers, and reveals how their domestication of horses and use of the wheel spread language and transformed civilization. Linking prehistoric archaeological remains with the development of language, David Anthony identifies the prehistoric peoples of central Eurasia's steppe grasslands as the original speakers of Proto-Indo-European, and shows how their innovative use of the ox wagon, horseback riding, and the warrior's chariot turned the Eurasian steppes into a thriving transcontinental corridor of communication, commerce, and cultural exchange. He explains how they spread their traditions and gave rise to important advances in copper mining, warfare, and patron-client political institutions, thereby ushering in an era of vibrant social change. Anthony also describes his fascinating discovery of how the wear from bits on ancient horse teeth reveals the origins of horseback riding.

Modest claims disappear when the announcement of Princeton Univesity Press goes on to make a summary claim:

> *The Horse, the Wheel, and Language* solves a puzzle that has vexed scholars for two centuries – the source of the Indo-European languages and English – and recovers a magnificent and influential civilization from the past.

This is echoed by another scholar who also looks for the urheimat away from India:

> The BMAC pottery is the source of the ceramics of the Gāndhāra Grave culture of Swat, which is the first culture of northern Pakistan to have the domesticated horse. This suggests that Proto-Indo-Aryan speakers had become the elite layer of the BMAC culture in southern Central Asia before spreading to the Indian subcontinent. [A. Parpola, 2005, 'The Nāsatyas, the Chariot and Proto-Aryan Religion', *Journal of Indological Studies*, Nos. 16 and 17 (2004-2005) http://www.helsinki.fi/aparpola/jis16-17.pdf].

Here is an instance of jumping from an artefact of pottery to language and unevidenced claim of 'elite' layer of BMAC.

Some statements which are conjectures are made to appear like facts: "We also think that horseback riding began in the steppes long before chariots were invented, in spite of the fact that chariotry preceded cavalry in the warfare of the organized states and kingdoms of the ancient world." (David W. Anthony, 2007, *The Horse, the Wheel, and Language*, Princeton Univ. Press, p. 19). This echoes the views held by Gimbutas school, but the evidence for these views has not been presented. According to Robert Drews, the first representation of a horse rider occurs on a Sumerian tablet from ca. 2000 BCE. (Robert Drews, 2004, *Early riders: the beginnings of mounted warfare in Asia and Europe*, Routledge). Clearly, Anthony's claim about horseback riding on European steppes is based on the slender evidence of tooth wear

observed in one horse skull. (Horse tooth scarred by bridle dated to 4300 BCE cited in David Anthony, Dimitri Y. Telegin and Dorcas Brown: 'The Origin of Horseback Riding', *Scientific American* 12/1991).

Reconstructing some words of Proto-Indo-European (PIE) speakers, who were farmers and stockbreeders, Anthony identifies words for bull, cow, ox, ram, ewe, pig and piglet noting that their possessions were categories as movables and immovables, the root for movable wealth being *peku – the ancestor of such English words as pecuniary. A word for wheel sounded something like 'roteh' and the word for axle 'aks'. Of course, Anthony notes that the origins of Proto-Indo-European was 'politicized almost from the beginning'. Anthony narrates events which built up the economic and, later, military power of PIE speakers following the domestication of horse ca. 2800 BCE followed by movements of mobile herders.

Anthony embarks on a grand enterprise seeking to identify the first Indo-European speakers and their first linguistic homeland in the steppes of Eurasia (what is now southern Ukraine and Russia) with the Yamnaya (between Dnieper and Volga) around 3500 BCE. He is skeptical of Jared Diamond's thesis that early Europe had much diffusion of innovation in the East-West direction. A review of his book in the *New York Times* stated, "Anthony is not the first scholar to make the case that Proto-Indo-European came from this region, but given the immense array of evidence he presents, he may be the last one who has to." Aside: Is this the final nail in the PIE coffin?

"The recovery of even fragments of the Proto-Indo-European language is a remarkable accomplishment," pleads Anthony, "considering that it was spoken by non-literate people many thousands of years ago and never was written down." Granting that there is no direct evidence, a '*' is placed before the word assigned to Proto-Indo-European speakers. Aside: why brush aside the voluminous texts available in the Vedic tradition? The texts won't go away by ignoring them or failure to analyse the messages communicated through this cultural continuum of Vedic tradition, a tradition unparalleled in civilization history for the impact it has had on every walk of life, particularly in all parts of India.

Anthony also provides in his integrated narrative, a wide interdisciplinary canvas to marshal the evidence; he provides references from Albion's Seed, Y: the descent of Man, evolution of lactose tolerance, phylogenetics of domesticated cattle, apart from a dense reportage of archaeological discoveries of many sites on Pontic Steppe pots, cemeteries, seed-husks – and spreading of the Indo-European speakers in all directions for about 1500 years since 3500 BCE. The impressive nature of the narrative is that obscure jargon is avoided and arguments presented in fluent prose.

If there are omissions in such a comprehensive work of Anthony, they relate to the failure to critically examine the intellectual bases for divergence of languages from a shared source, Proto-Indo-European. Such an examination should have involved the comparison of known languages, apparent similarities and resemblances of cultural indicators of Homeric epics or the Vedas, symbols of power and shared military values. Anthony also fails to explain why the quintessential attributes of PIE also occur in far-off regions: cattle breeding, sheep rearing, wheeled transport, weaponry and ornaments in 'elite' burials of the Middle East. The poetry of the Vedas in a category called *chandas* and *saama gaana*, is NOT even discussed by Anthony. If poetry was so powerful, what greater evidence to evaluate than the *Ṛgveda* and related *mantra* chant which has been handed down from generation to generation all over India?

If the horse-drawn chariot was invented in early 2nd millennium BCE, how is the rapid diffusion into Shang China, Mycenean (Greece) and Egypt to be explained? If this was technological cross-fertilisation, why should language alone be presented as derived from a single root? Is PIE a 'dead language' as Anthony avers or a grand reconstruct of modern philology?

Most linguists believe that Anatolian branched off from PIE because it has unique features of grammar 2 genders not 3, 2 tenses not 6, 2 numbers not 3 (singular, plural, dual) – not found in other PIE languages. If PIE was Anatolian, how come PIE evolved extra tenses, gender and number? Could it simply be that Anatolian language branch changed itself by simplifying the grammar or because of association with Semitic languages with only two tenses and two genders? Doesn't language evolution love simplicity and move in the direction of simplification? Why does Anthony omit a study of Vedic grammar of the *Saptasindhu* region and Sarasvati River basin – and see how the complexities of *ārya vācas* as distinct from *mleccha vācas* (cf. *Manu Samhita*), got simplified in neighbouring languages? Maybe, this is an area for research in evolution of languages that scholars should take up afresh.

It is surprising that Anthony provides such a low chronology for PIE 4th millennium BCE. It is about the same time when the Tower of Babel was supposed to have occurred and later use of Biblical categories of Japhet, etc. used by William Jones to explain language evolution.

There are some scholars who claim that a few similarities between Sumerian and PIE could be due to contact, though Anthony had noted in his earlier work that Indo-European was not documented in the earliest Mesopotamian record. (David W. Anthony, 1991: 'The Archaeology of Indo-European Origins', *Journal of Indo-European Studies*, Fall 1991, p. 197). Some examples of similarities are noted: Sumerian *tur* (yard), PIE **dhwer*; Sumerian *ngud/gud/gu* (bull), English *cow*; Sanskrit *go*. Maybe, Anthony should have

delved deeper into such semantic indicators which explain evolution of language by contact.

Discovery of skulls and bones of sacrificed horses are explained as burial customs which are seen to resemble a later people who called themselves 'Aryans'. Is the evidence strong and conclusive enough to suggest that this was the form of 'horse sacrifice' mentioned, say, in the *Ṛgveda*? Wasn't the term 'aryan' in its early usage simply a term denoting 'character' and not a term denoting category of people? Maybe, it was a term denoting levels of language proficiency of the same people, *dasyus*: one group spoke ungrammatical *mleccha* and the other grammatically correct *ārya vācas* (good speech).

Anthony seems to suggest, based on gut feelings and based on finds of chariots in graves of the steppes, a revision of the history of the wheel from a pastoral setting rather than from the more urban society of the Middle East? "Scholarly caution tells me the matter is not resolved," said Dr. Anthony earlier in 1994. "But my gut feeling is, there's a good chance the chariot was invented first in the north." (Feb. 22, 1994, John Noble Wilford's article, 'Remaking the wheel: evolution of the chariot', *New York Times*). The same article quotes Dr. James Muhly that chariotry may well have developed before the dispersal of original Indo-European speakers. The 'gut feeling' of Anthony and the relative chronology hypothesis of Muhly have to be tested further by evidence from many archaeological sites of Sarasvati Civilization.

The word used for horse in *Ṛgveda* is *aśva* (or Indo-Iranian *ashva*). Could this be the root for the 4th millennium Sumerian word *si-si* and Hebrew *sUs*? This leads to the question of the relative chronology of *Ṛgveda*, which clearly evolved on the banks of River Sarasvati (or the *Saptasindhu* region). Given that horse and wheeled cart are part of PIE vocabulary, why couldn't this basin have been the PIE urheimat having realized the use of the domesticated horse as a puller of the chariot? Could the idea of domestication come from this *Saptasindhu* region into the steppes because the region had already domesticated oxen and donkeys? (See http://www.scribd.com/doc/2262092/domesticationofdonkey1 Harvard Donkey Trial and domestication of donkey, horse). Horses (or, perhaps onagers) were known in India as evidenced by the rock paintings in Bhimbhetka, Bhopal (unauthenticated dating of ca. 30000 years old). Domesticated horses have been found at Rana Ghundai (Punjab-Baluchistan) dated to ca 3,600 BCE (Harry H. Hicks & Robert N. Anderson: 'Analysis of an Indo-European Vedic Aran Head, 4th Millennium BC', *Journal of Indo-European Studies*, Fall 1990, pp. 425-446, specifically p. 437). There is also strong evidence to suggest that horse was NOT an 'Aryan' import from outside India because there

are words for the horse in other Indian languages: Old Tamil *ivuLi* (wild horse); Brahui *(h)ullii* (horse) *kutirai* (domesticated horse); Nihali *māv* (horse); Sino-Vietnames *mā* (horse). Gondi *gārdi* (horse) compares with Sanskrit *gardabha* (from *gard-* 'to shout'). *Ṛgveda* refers to a horse having 34 ribs (*Ṛgveda* 1.162.18) while *equus caballus* has 36 ribs. Was this horse with 34 ribs a genetically inherited trait or a unique breed of horses? The question remains to be explored further.

An alternative approach to the study of formation and evolution of languages of Eurasia is presented in the South Asian context by Emeneau. (M.B. Emeneau, 1956, 'India as a linguistic area', Lg 32, pp. 3-16; 1974, Indian linguistic area revisited, *Indian Journal of Dravidian Linguistics* 3, pp. 92-134). He postulates a linguistic area in India where many languages absorbed features from one another and made them their own. Such a model of cultural assimilation may be an alternative to the illusory chase for a single-point origin of languages as evidenced by the still ongoing search for urheimat. An Indian Lexicon has been constructed with presents over 8000 semantic clusters of the linguistic area pointing to the cultural substratum, which yielded many common roots for many words ranging from agriculture or medicinal plants to metallurgy, from parts of the body to profound thoughts related to the divine and cosmos. http://www.scribd.com/doc/2232617/lexicon. B.B. Lal presents evidence for the homeland of Aryans in *Saptasindhu* region. (B.B. Lal, 2005, *The homeland of the Aryans: evidence of Rigvedic flora and fauna and archaeology*, Delhi, Aryan Books International). The absence of any memory of these Ṛgvedic people of the life in pastoral steppes is an intriguing fact that has to be explained by any researcher engaged in the study of evolution of languages and cultures.

Colin Masica elucidates the research problem further. (Colin P. Masica, 1976, *Defining a linguistic area: south asia*, Univ. of Chicago Press).

> It is one of the quirks of the development of languages that when two dialects are in close proximity they tend to diverge until they become mutually unintelligible languages, whereas two mutually unintelligible languages in close proximity tend to inter-act upon the other and consequently converge and become more similar. Masica defines (p.3) a linguistic area as a zone within which the process of convergence are seen to operate with special strength and urgency, presumably because of particularly favourable conditions. (Book review by K.R. Norman, 1979, *Modern Asian Studies*, Vol. 13, No. 2, 1979, p. 336).

The possible readings of Sarasvati hieroglyphs both pictorial motifs and signs used on epigraphs inscribed on materials such as seals, sealings, copper tablets, metallic weapons – as related to about 1000 metallurgy terms of minerals, metals, alloys, furnaces which are not of IE origin – point to an

area of research related to the evolution of technology terms as the innovations unravel. Same is the case with the presence of over 80% agricultural terms in Indian linguistic area which cannot be explained as borrowings or as derived from PIE. (Franklin C. Southworth, 2005, *Linguistic archaeology of South Asia*, Routledge-Curzon; Franklin C. Southworth, 1988, 'Ancient economic plants of South Asia: linguistic archaeology and early agriculture', pp. 649-68 in *Languages and Cultures: studies in honor of Edgar C. Polome*, ed. M.A. Jazayery and W. Winter, Mouton de Gruyter).

The most significant lapse in Anthony's magnum opus is the absence of an answer to the points which had been raised earlier in 2002 by Philip Kohl. Let me cite from this seminal monograph of Kohl:

> ...Just as a cart does not resemble a horse, the migrations of the third and second millennia BCE pastoralists who were still involved with agriculture did not resemble the migrations of mounted nomads in later centuries. The former were markedly slower and more gradual, and land suitable for cultivation interested the migrators no less than new pastures did (Khazanov, 1994, *Nomads and the outside world*, 2nd edn., Madison, Wisconsin, The Univ. of Wisconsin Press, p. 94). The theory of a movement of mounted nomads from the east relies heavily on evidence of Copper Age horse domestication from the Sredny Stog site of Dereivka (D. Ya. Telegin, 1986, *Dereivka: a settlement and cemetery of Copper age horse-keepers on the middle Dniepr*, Oxford, BAR International Series 287), particularly the demonstration of bit wear on the famous 'ritual' stallion skull found at the site (D.W. Anthony and D. Brown, 1991; 'The origins of horseback riding', *Antiquity* 65: 22-38; D.W. Anthony, 1996, 'Bridling horse power: the domestication of the horse', in S.L. Olsen (ed.), *Horses through time*, Dublin, Roberts Rinehart Publishers for Carnegie Museum of Natural History, pp. 57-82). The calibrated C14 date taken from this skull has shown it to date at least 1000 years later in the Bronze Age (M. Levine, 1999, 'Origins of horse husbandry', in M. Levine Rassamakin, A. Kislenko and N. Tatarintseva (eds.), *Late prehistoric exploitation of Eurasian steppe*, Cambridge, McDonald Institute Monographs, p. 14, Table 2.1), and there is indisputable evidence now for the mixing of materials from later levels at the site, leading Levine (1999: 15-19) to refer to the entire evidence for Copper Age horse domestication at Dereeivka as a myth; other skeptics (e.g., A. Hausler,1994; 'Archaologische Zeugnisse fur Pferd und Wagen in Osi- und Mitteleuropa', in Hansel, B and S. Zimmer (eds.), *Die Indogeremanen und das Pferd. Festschr, Bernfried Schlerath*, Budapest, Archaeolingua, pp. 217-25, 1995; 'Die Entstehung des Aneolithikums und die nordpontischchen Steppenkulturen: Bemerkungen zu einer neuen Hypothese', *Germania* 73: 41-68) had come to this conclusion even prior to these new radiocarbon determinations, dismissing the evidence for a Chalcolithic horse cult at Dereeivka or at Khvalynsk. The archaeological

evidence cited to support an east-west movement of peoples, such as the distribution of the abstract and animal-headed stone scepters, is much more reasonably interpreted as indicating the existence of a prestige-goods exchange network than such a migration. If one is going to explain the collapse of the Varna-related cultures as due to an invasion from the east, one also has the problem of circumventing the giant Tripolye-culture sites which are beginning to develop at the time of this supposed east-west migration (M.Y.Videjko, 1996, 'Grossiedlungen der Tripole Kultur in der Ukraine', *EurAnt* I: 73). The environmental crisis model has the virtue of proceeding in the right direction: the observed sequential archaeological collapse from the south-west to the north-east corresponds to different latitudinal zones being affected at different times due to this progressive onset of more arid conditions and changes in sea-level (Philip L. Kohl, 2002, 'Archaeological Transformations: crossing the pastoral/ agricultural bridge', in *Iranica Antiqua*, Vol. XXXVII, 2002).

Philip Kohl summarises his hypothesis:

The concept of an archaeological culture, however problematic in itself, is based on detecting similarities in material remains that are relatively restricted in time and space. What happens when a people moves or changes fundamentally its way of life, switching from an agriculturally based to a pastorally based economy or the reverse? The same people or their direct descendants now exhibit a different archaeological culture.

He proceeds to evaluate the settlement or peopling of the lowland plains of Margiana and Bactria at the end of the 3rd millennium BC.

The settling of the plains of Margiana and Bactria during Late Bronze times was undoubtedly a very complex process that contained several components including strong influences from the long-established settlements of southern Turkmenistan immediately to the west and from other early sites to the south in Baluchistan that already had public architecture and other material culture similarities with the later remains of Margiana and Bactria Andronovo-related nomadic cattle herders who gradually entered the plains of southern Central Asia and became more intensive irrigation agriculturists, adopting the material culture of their more 'civilized' sedentary neighbors .... Western scholars have observed similarities with other areas and in other materials, including earlier stone and metal seals and public architecture, from sites located to the south in eastern Iran, Afghanistan, and Pakistani Baluchistan to suggest southern roots for the BMAC from these regions, if not also from the Indus Valley itself.

One environment crisis model to be deliberated upon in the October 2008 conference relates to the secular desiccation of Vedic River Sarasvati

and the settlements on this river basin as the epicentre of the most extensive maritime/riverine civilization of its times.

This brings the inquiry closer to the basin of the Vedic River Sarasvati.

Anthony devotes only a few pages to the study of the language of *Ṛgveda* and the anectodal, sporadic geographical and linguistic area evidences provided therein. He notes:

> The language of the *Rig Veda* contains many traces of its syncretic origins. The deity name *Indra* and the drug-deity name *Soma*, the two central elements of the religion of the *Rig Veda*, were non-Indo-Iranian words borrowed in the contact zone (Indra) He was associated more than any other deity with *Soma*, a stimulant drug (perhaps derived from *Ephedra*) probably borrowed from the BMAC religion. (*ibid*., p. 454).

Anthony fails to divulge the nature of this BMAC religion. In this instance, Anthony has already concluded without evaluating language evidence that *soma* was a drug. He also later in his book assumes an elite incursion of Aryans from Iran noting that the Indo-Iranian *haoma* is itself borrowed from an earlier formation of the word. Why couldn't *haoma* be a derivative of an earlier *sauma*?

> The speakers of common Indo-Iranian were in touch with and borrowed terms from *the same foreign language group* that later was the source from which Old Indic speakers borrowed even more terms. This discovery carries significant implications for the geographic locations of common Indo-Iranian and formative Old Indic they must have been able to interact with the same foreign-language group. Among the fifty-five terms borrowed into common Indo-Iranian were the words for bread (**nagna*-), ploughshare (*sphara*), canal (**iaviaa*), brick (**istia*-), camel (**Hustra*-), ass (**khara*-), sacrificing priest (**ucig*-), soma (**ancu*-), and Indra (**indra*-). The BMAC fortresses and cities are an excellent source for the vocabulary related to irrigation agriculture, bricks, camels, and donkeys; and the phonology of the religious terms is the same, so probably came from the same source.

There is a leap of faith involved in this argument that only BMAC fortresses and cities provide the source for the selected terms, without evaluating the evidences of fortifications and organized cultivation in Sarasvati Civilization linguistic area in sites such as Kalibangan, Dholavira and Bhirrana. In fact, Anthony does not even discuss the finds of spoked-wheel representations on terracotta found in Bhirrana which is a site evidencing continuous settlement from 5th millennium BCE through all phases of the civilization on the Vedic River Sarasvati basin. (See Michel Danino, 2006, *The horse and the Aryan debate*; this briefly links to the evidences related to horse and spoked wheel particularly in Lothal and Bhirrana).

It is possible that one such language was *mleccha* mentioned in Manu, Veda Vyāsa and by Vātsyāyana. (1) Manu notes (10.45):

mukhabāhurūpajjānām yā loko jātayo bahih
mlecchavācaś cāryavācas te sarve dasyuvah smṛtāh

The key phrase is: *te sarve dasyuvah smṛtāh*, that both the mleccha and arya speakers are *dasyu*. Mleccha spoke ungrammatical *bhāṣā*; arya spoke literary *bhāṣā*. Both are earlier versions of Pali, Prakrit, Sanskrit, Tamil, Munda indeed the dialects of the Indian linguistic area.

The reference to *mleccha vācas* is in the following śloka in *Mahabharata* Adi Parva, Jatugriha Parva CXLV CXLIX:

kin cicca vidureṇokto mlechchha vācāsi pāṇḍava.
tvayā tattathetyuktametadviśvāsakāraṇam .. 6

Vatsyayana in *Vidyāsamuddeśa* lists 'mlecchita vikalpa' among three language-related arts out of 64 arts: the language-related arts listed are: *akṣara muṣṭika kathana, deśa bhāṣā jnāna, mlecchita vikalpa* (that is, communicating through wrist-finger gestures, knowledge of dialects and writing system of mleccha (or, alternative representation in writing of spoken words).

Sememes: sarasvati; the need for re-inventing IE linguistics.

One example can be cited. The IE linguistic myth of *selos- > saras gets exposed by the following sememes evidenced in the linguistic area of Bharatam. When a root *sṛ* 'to flow, to spring up' is so widely attested over an extensive linguistic area (and the *ralayorabhedah* or *r-l* transform common in the Ganga basin from ancient times), there is no need to posit a hypothetical *selos as an evidence of the mythical word in IE.

Some sememes of Bharatiya linguistic area: 'to flow, to spring up'

DEDR 2366 *Ta*. calacala onom. expr. of purling as of water; cala-cal-enal onom. expr. of rustling as of dried leaves, sounding as of drizzling rain; calacala (-pp-, -tt-) to rustle, be talking incessantly. See Turner, *CDIAL*, no. 5002, *chala-, e.g. H. chalchal to move with a rustling sound, make a rippling sound, etc.

DEDR 2367 *Ka*. calame, calime, calume, calme, cilume an orifice, a bore, small pit, hole dug in the dry bed of a river or a dried-up tank, spring of water or a fountain head. *Br*. kal place where water collects, water-hold (or < H. khal creek, inlet, canal, river, trench; cf. MBE 1961b, pp. 377-8).

DEDR 2384 *Ta*. callu (calli-) to sprinkle water. *Ka*. callu, cel, cellu, celāku to scatter, pour out, shed, spill; callisu, cellisu to cause to scatter, etc.; calaku, cala'ku, cala'gu to let go from the hand, discharge, throw away; jellane with a violent gush (of water); *Kuwi* (S.) jallinai to scatter; (Isr.) jal- (-it-) to throw out liquids.

CDIAL 5155 jala-n. 'water' MBh. [Pa. Pk. *jala* n. 'water'; K. *zal* 'urine'; S. *jaru* m. 'water', L. (Ju.)

CDIAL 5165 *jalya 'collection of water'. [jala] Pa. *jalla* n. 'moisture, wet dirt, sweat , *jallika* f. 'drop (of sweat), dirt'; H. *jalla* m. 'mass of water, reservoir'.

Munda prefix *sṛ*- + dak 'water', cf. KEWA

The root: *sṛ* Dhātup. xxii , 37 ; xxv , 17, {sarati} 'to flow, to spring up'

These examples have to be examined by the IE linguists before theorizing on IE origins or *selos- > saras hypothesis. 8000 such semantic clusters of the Indian linguistic area exist – simply, IE is not the be-all and end-all to explain Indian linguistic area with a large percentage of agricultural terms and smithy terms which have no IE equivalents.

The preoccupation with steppes and European archaeological/ language evidences blinds Anthony and he fails to take an unbiased look at the evidence from about 2,600 archaeological sites on the Sarasvati River Basin (however, perfunctory the evidence in the absence of detailed archaeological explorations and investigations). Anthony should at least have paid attention to the language evidence presented related to the linguistic area of India. The pre-judgement has already occurred as is evidenced by statements such as the following:

> The people of the *Rig Veda* did not live in brick houses and had no cities, although their enemies, the Dasyus, did live in walled strongholds. Almost all important deities were masculine. The only important female deity was Dawn, and she was less powerful than Indra, Varuna, Mithra, Agni, or the Divine Twins. Funerals included both cremation (as in Federovo graves) and inhumation (as in Andronovo and Tuzabagyab graves). Steppe cultures are an acceptable source for all these details of belief and practice, whereas the culture of the BMAC, with its female deity in a flounced skirt, brick fortresses and irrigation agriculture, clearly is not. (p. 456).

Anthony does not notice the importance given to Sarasvati or Aditi. In one rica, Ṛṣi Gṛtsamada refers to Sarasvati in three forms: as mother, as river and as devi *ambitame, naditame, devitame sarasvati*. Nor does he analyse the possibility that the belief and practice evidenced in the *Ṛgveda* could have been evolved indigenously in *Saptasindhu* region and, in particular, on the basin of Vedic Sarasvati River.

Why should there always be an external influence in such belief or practice? Such generalizations and sweeping conclusions renders Anthony's work less credible in so far as the explanation for the spread of PIE into so-called Indo-Aryan languages is concerned. Surely, a lot more language studies are called for to identify the source languages of the *Ṛgveda*. They

could be seen to be the language words which explain the Sarasvati hieroglyphs in relation to smithy/mint which resulted in extensive trade contacts using seals and sealings to transport mine-, mineral-, metal-, alloy-products in a riverine/maritime civilization area extending from the foothills of the Himalayas to Tigris-Euphrates doab across the Gulf of Kutch, Gulf of Khambat and Persian Gulf. See the 15 ebooks at http://sites.google.com/site/kalyan97. It is simply possible, as argued in these texts by comparing the *Ṛgveda* verse for verse with *Avestan*, that Avesta is later than *Ṛgveda* in chronology and that *Ṛgveda* as it has come down with astonishing fidelity should have taken several centuries to reach the stage of poetic expression of unsurpassed excellence. Why not a hypothesis alternative to single-source PIE such as the Proto-Vedic Continuity Theory? The casual coverage of this extensive civilization area (denoted by the India linguistic area) in Anthony's otherwise magnificent work is a provocation to Hindu Civilization scholars to do their research work and match up to Anthony's hypotheses, however tenuous they are and however flimsy the evidence which is sought to be relied upon for arriving at sweeping conclusions about movements of ancient people across Eurasia.

In this perspective, the work in civilization studies has just begun. Anthony has lit the lamp. It is now the responsibility of students of Hindu Civilization to propose how Sarasvati's children shaped the cultural continuum in Hindusthan and influenced through contacts, the cultures of Eurasia. A good evidence for such contacts is the find of two pure tin ingots with Sarasvati hieroglyphs in a ship-wreck in Haifa, Israel.

NEED FOR SEMANTIC STUDIES

Indo-European linguistics has to re-examine its premises of phonetics resulting in unutterable * hypothetical phonemes and start afresh with studying the semantics of Indian linguistic area before rushing to posit invasion/migration scenarios from a non-existent urheimat and a non-existent proto-IE before organized farming and use of alloys began. IE linguistics may wax eloquent about European languages but should stop theorizing about the formation and evolution of Indian languages from an unauthenticated IE premised principally on phonetic methods. Semantics grounded on the cultural foundations, can better explain dialect transformations in a linguistic area as was shown in the root of the linguistic area: *sṛ* 'to flow, water' (Skt. Munda).

There is such enormous attested, authenticated evidence available in the literary texts and epigraphs of the Indian linguistic area that it is necessary to re-study this area without any pre-conceived biases leading to a wild-goose chase searching for IE roots for e.g., for every Prakrit, Pali, Nahali or Tamil sememe of Hindusthana.

14

Sarasvati Civilization: Past, Present and Future

Gauri Mahulikar

River Sarasvati is considered as the backbone of not only the Vedic civilization; but also of the epic as well as the modern Hindu Civilization. India's culture and civilization, both flourished along the banks of Sarasvati. This is authenticated by the Vedic texts and later supplemented by the epics and the *puranas*. *Ṛgveda* (*RV)* glorifies this river in three entire hymns (*RV*.VI.61, VII.95,96). Besides this, the name Sarasvati occurs in the *RV* 72 times.

Sarasvati is lauded in the superlatives as the best river, best mother and best goddess (*RV*.II.41.16). She is one of the seven rivers; the other six being, Shutudri, Vipas, Parusni, Asikni, Vitasta and Sindhu. Two of these, Sarasvati and Vipas subsequently dried up, possibly during Manu's *pralaya* and became insignificant and as a result, the *sapta-sindhavah*, by the loss of two rivers, came to be called Punjab, land of five rivers (N.N Godbole, p. 12). The Sindhu was also a mighty and torrential stream. She stood for action, work velocity and trade whereas the Sarasvati was the emblem of and stood for mental, moral and spiritual culture of the Aryans. While Sindhu represented the material and agricultural prosperity, Sarasvati was reputed for quiet and peaceful spirituality (Godbole, p. 13). Many smaller tributaries are said to pour water in her streams. The *Yajurveda* (*YV*. 34.11) mentions five such rivers. These are Drsadvati, a rocky stream (*drsad* in Sanskrit means stones/rocks), Sutudri (modern Sutlej), Chandrabhaga (modern Chenab), Vipat (modern Vyas Beas) and Iravati (modern Ravi). In the hymn to the rivers (*RV*. X.75), Sarasvati is placed between Yamuna and Shutudri. This is the location of river Ghaggar or Sarsuti in the geography of modern India

(http:// wikipedia.org). She is called *sindhumata,* mother of rivers/streams. From the mountain Himalayas, she flowed to the western regions, fertilizing the land on both her banks, nourishing the people and spreading Hindu Civilization. Over 1200 of the 1600 archaeological sites of the civilization (viz: Ropar, Dholvira, Rakhigarh, Banwali, Lothal, Bet Dwaraka, etc.) unearthed during last 70 years have been found on the Sarasvati River basin (Kalyanaraman, 1999, p. 9). Although the Harappan Civilization is ascribed to the Indus (Sindhu), most of its sites lie along the now dried Sarasvati. It is therefore more appropriate to call the Harappan Civilization as the Sarasvati-Sindhu Civilization. (N.S. Rajaram, 1994, p. 87).

India with her multi-lingual, multi-racial and multi-religious faiths, was always considered as a colourful mosaic of diverse tastes and views; yet the perennial stream of Sarasvati bound all the differences together and flowed on and on. In order to understand the history of the Rigvedic age, we must study the ebb, the flow and the ecology associated with this mighty river. This ecological data tells that the Harappans were a part of the Vedic Civilization and that they fell victim to a sudden calamity which forced them to take shelter in other parts of ancient India. This calamity was not floods. Floods, no doubt, bring death, but they also sustain life, they are devastating, but cannot be the cause of abandonment. On the contrary, the flood-prone areas are the most densely populated areas in the world. In India, for example, river Brahmaputra causes destruction every year, and yet its banks are densely populated. River Kosi in Bihar, gets devastating floods every year; yet is most populous. On the other hand, loss of water can cause massive disruptions and mass migrations. There are three main causes of dessication of a river: 1) Tectonic changes, uplifting the terrain. 2) Sudden increase in the mass of water of the tributary river, which may be due to melting of huge glacier and 3) Impediments in the stream of a river. This could be a natural calamity or man-made hindrances. In the case of Sarasvati, the abrupt climatic changes caused the desiccation of Sarasvati. It is learnt that in 2450 BC the Himalayan ranges were shaken by grave earthquake, which totally destroyed the famous city Kalibagan, situated on the bank of Sarasvati. This is an archaeological truth, proved and accepted by many scholars. Because of this quake, the eastern stream of Sarasvati got disrupted and the river got merged in Drsadvati flowing towards its south. The main water source of the Himalayan glacier was then cut off by 95%. The quake lifted the river bed westwards, whereby the water source from river Sutudri also got separated. Sarasvati then flowed only when it rained and virtually became dried pond all through the year. Gradually, due to variation in atmospheric conditions, Sarasvati dried up. Kuruksetra, once

upon a time regarded as heaven, (*Mbh.* III.83.4) lost its glory and was transformed into a gory battlefield. Remote sensing system and radar images of Haryana, Punjab, Rajasthan, Gujarat and some part of Pakistan have proved that there are palaeo-channels in the dried bed of Sarasvati flowing through those regions. Another strong proof is the chemical analysis of underground water in these areas. This analysis showed tremendous similarities between the chemicals found in the Himalayan rivers and the sample water taken from the palaeo-channels. The researchers did radio carbon testing and proved that the sample water is thousands of years old and has very less tritium in it.

Nevertheless, it is interesting to see how this river nourished the people on her banks during the Vedic times. She is often referred to as nourishing five people, *panca jata vardhayanti* (*RV*.VI.21.2). Historically and sociologically the names of these five people are important. They are: Bharatas, Kurus, Purus, Matsyas, and Panchalas. According to others they are the five sons of King Yayati viz., Anu, Puru, Yadu, Druhyu and Turvasu (Khan, 1978, pp. 17, 18). Sayana, the commentator of the *RV* says, they are Brahmana, Ksatriya, Vaisya, Sudra and Nisada. In short, they were various inhabitants at Sarasvati, some from royal families, some from very ordinary descent, who stayed there and contributed to Indian culture and civilization in their own manner. Some of these were big empires. Bharatas, for example, were a warrior class, descendents of Visvamitra and worshippers of Indra. Sarasvati became Bharati because of Bharatas. Divodas and Sudas were glorious kings of this clan. Sage Vasistha vividly describes the battle between the Bharatas and a federation of ten kings (*RV*.VII.18, 33, 83).

Kurus ruled over the north-east part of India. Kuruksetra is the land inhabited by Kurus. Kurusravana was their glorious king, who had patronized Kavasa Ailusa, the seer of *RV*. X.30-34 hymns as his family priest. Being a son of a maid, he was considered unfit to perform sacrifice and was abandoned by Angirasas on the banks of Sarasvati in a thirsty condition. Kavasa recited a hymn to Apam Napat (*RV*.X.30). Sarasvati was pleased and rushed towards him (*Aitareya Br*. 2.19). Thus not only kings, but even the Sudras were benefited and obliged by Sarasvati. Sociologically, it is noteworthy that in ancient Sarasvati Civilization people lived in harmony. One of the descendents of Kavasa consecreted Janamejaya Pariksita (*Ait. Br*. 8.21).

Purus were associated more with Parusni and referred to along with Yadus, Druhyus and Turvasus, the sons of Yayati, who joined hands with some non-Aryan kings against Bharata Sudas, king of north Panchala region. In this battle Sudas, with the help of his priest, Vasistha, seeked favour

from Indra and Varuna and became victorious. This westward conquest, in a way, refutes the Aryan invasion theory, which speaks of Aryans coming from west to east. Of course this is not the place to discuss the issue of Invasion theory, what is important is that different tribes and types of people helped the enrichment of Sarasvati Civilization.

Among the intellectual contributors are the Vedic seers, specially Vasistha, who has praised Sarasvati in two full hymns in his 7th *mandala*. Sage Grtsamada too, seeks her blessings in the form of reputation and good progeny. Significantly Sarasvati is connected with fertility. She is asked to place embryo and invoked for safe pregnancy (*RV*.X.184.2). The Persian counterpart of Sarasvati, known as Aredvi Sura Anahita is invoked by Zoroastrian women even today for safe delivery (*Aban Yasht* 5.87).

Sarasvati, mother of life sustaining water, *Sindhumata* continued to bestow life and treasures to Sarasvatas, the people on her bank for thousands of years; but after the desiccation of the river which extended over a period of 400 years, between 1900-1500 BC, people started migrating eastward, northward and southward. The gradual disappearance of this river led to mass migrations to various parts of the country, giving rise to smaller denominations and back-grounds. Subsequent historical occurances and onslaughts resulted into further fragmentation of the community.

The epic *Mahabharata* describes Sarasvati as a holy and best river, the foremost of all the rivers and meeting the ocean (*Anusasana* 134.15). *Salya parva* mentions Balarama's pilgrimage along the banks of Sarasvati, from Dwaraka to Mathura. Balarama started his pilgrimage from Prabhasa pattana (Modern Somnath). Following the course of Sarasvati, he then went to a place called Chandodbhava Tirtha, where the river reappeared. Thereafter he went to various *tirthas* and came to Dvaitavana where he saw the river taking eastward course. Then he went to Naimisa and then to places on the east bank of the river. After visiting few more places, he finally reached Plaksa Prasravana. During the epic time Sarasvati had already started waning, and Balarama describes her as appearing and disappearing at places, its flow being interrupted by the encroaching desert.

The late Dr. Wakankar conducted a tour along the course of the river as described in the Vedas, Puranas and epics. A 3530 km survey from Adi Badri (in Haryana) to Somnath was started in 1985, marking 150 sites along the route. Apart from the circumstantial evidences, the scientific method of multi-spectral scanner (MSS) was widely used to endorse his findings. The interpretation of LANDSAT imagery of the western part of Jaisalmer district revealed buried courses of the river running from NE to SW. This course is found to have links with the dry bed of Ghaggar River. In spite of very low

rainfall in Jaisalmer, and extreme conditions of the desert, groundwater is available at depth of 50-60 metres along the course of the defunct river and a few dug wells do not dry up throughout the year (*Current Science*, Vol. 72, p. 60). It is found where the river bed is traced, supports vegetation even during summer. It is thought that these courses of river in the area still maintain their head water connection and could form potential groundwater sanctuaries for exploitation. Two scientists from BARC (Rao and Kulkarni) working in isotope division have conducted an environmental study in collaboration with the Groundwater Department, Rajasthan and arrived at above conclusions.

Sarasvati Shodh Prakalpa is established now inspired by the untiring efforts of indologists, archaeologists, scientists, historians and geologists. There are three main stages of this project.

(1) Reactivating and linking the ancient channel of Sarasvati, from Adi Badri to Pehoa (Prthudaka Tirtha in the Mahabharata). It is a channel of 100 km, north of Kuruksetra, in Yamunanagar district. This is financed by the world bank.

(2) Pouring water from Sutudri (Sutlej) through huge pipes into this new channel. An anonymous donor has come forward to finance this stage of the project.

(3) Reactivating the 1600 km hidden stream of Sarasvati from west Garhwal to Somnath in Gujarat, through application of remote sensing techniques. A team of researchers from BARC is engaged in chemical analysis of groundwater in this area. When complete, this project is supposed to benefit two crore people from north-western India. Rajasthan alone would then be getting sufficient drinking water through one lakh bore-wells, permanently dug up in the arid area. In addition green forest project can be undertaken and oil-seeds like olive, almonds, and safflower can be grown instead of wheat, rice and sugarcane that require surface water to grow. Solar energy will be used wherever necessary. This entire project is very ambitious.

Some highlights of Sarasvati Shodh Prakalpa:

In the history of human civilization this is a unique project.

Reactivating the river, by searching the palaeo-channels by satellite photographs.

Scarcity of drinking water in the NW India, specially the arid region of Rajasthan would come to an end.

Seemingly impossible task made possible by Indian scientists and technologists, which is a matter of pride for every Indian.

Reactivating the mighty river flowing since 5000 years, itself is a cultural heritage for every Hindu.

Many Internationally renowned institutes like BARC, ISRO, NASA, ASI, Geological Society of India, Central Water Commission, Central Arid Zone Research Institute have joined hands in this BHAG (big, hoary, audacious goal).

Indira Gandhi Nahar Pariyojana (IGNP), a large irrigation and drinking water project, a small part of this huge project is already catering to five districts in western Rajasthan since 1982.

Once again our motherland would be 'Sujala' and 'Suphala'

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15

Vedic Rites Flourished on the Banks of Sarasvati

A.K. Sharma

The once mighty and sacred river Sarasvati, the fountain head of Hindu civilization, which remained unseen on the surface for nearly two thousand five hundred years due to the upliftment of the Himalayan region during pleistocene and subsequently due to the rise of Siwalik hills that led to Sarasvati's drainage being cut off[1] coupled with massive deforestation, change of climate and advancement of Thar Desert, is, as per latest scientific studies, reviving, or rather resurfacing on its old course. According to Dr. J.P. Mittal, Director of Atomic Research unit at Bhabha Atomic Resarch centre, Mumbai,[2] ancient river Sarasvati is still flowing beneath 30 m. depth in Rajasthan as indicated by Satellite imagery.

A.K. Gupta (*et. al.*)[3] state that clear signature of palaeo-channels on the Satellite imagery in the from of a strong and powerful continuous drainage system in the north-west and occurrence of archaeological sites of pre-Harappan, Harappan and post-Harappan age, beyond doubt indicate the existence of a mighty Palaeo-drainage system of Vedic Sarasvati River in this region. The major (western most) channel of river Sarasvati remained more or less constant and unchanged and is considered to be the actual Rig Vedic Sarasvati River. The description and magnanimity of these channels also matches with the river Sarasvati described in the Vedic literature. From the prominence and the width of the palaeo-channels on the Satellite data, supported with data from archaeological finds, age and quality of ground water, sediment type, etc., it is confirmed that river Sarasvati had its major coarse through present day river Ghaggar. Sarasvati River never sifted its coarse drastically and continuously from east to west as suggested by some

of the earlier workers (Bakliwal and Grover, 1988)[4]. Rise in Himalayas/ Siwaliks and consequent displacement in the Siwaliks and its foot hills region (in the form of Yamuna and Satlej tear faults) are the main cause for drainage desiccation and disappearance of river Sarasvati.

In a persons like three events, birth, marriage and death are most important. In Hindu religion there are elaborate norms for these events based on Vedic rites. Here I am going to discuss about the last one for which concrete evidences indicate the vedic practices on the bank of Sarasvati at the Harappan sites of Kalibangan in Rajasthan.

Excavation of Harappan cemetery at Kalibangan,[5] in many respects, is of great significance. Apart from the known mode of disposal of the dead it has revealed two hitherto unknown methods in Harappan context. Demographic survey[6,7] of the cemetery areas has also given the approximate number of different types of burials. Osteo-archaeological study of the skeletal remains, though only of one season, has thrown light on the pathological aspects of the Harappans buried there. As the entire field note was prepared when the burials were lying in situ after exposing them, it was not possible to take measurements of the skull, though in situ measurements of other parts of the body could be taken. In the absence of measurements of the skull, it is not possible to say anything about the racial composition of those who were buried. We will have to wait for the reports from the Anthropological Survey of India. But taking into account the maximum in situ length of the skeletons (of course including all possible errors due to cracks and minor displacements) and the in situ maximum length of the right humerus, the average height of adult males as per Pearson's formula varies form 1.75 in to 1.55 in whereas those of females from 1.45 in to 1.55 m. This clearly indicates that they were people of good height. It appears the life expectancy did not exceed beyond fifty-five to sixty years as majority met death during their middle ages. But this has to be seen from the point of view that a good number of them were abnormal cases.

So far as grave furniture are concerned, leaving pottery, other antiquities were only few. They mostly consisted of ornaments like beads, bangles and rings. Only in one case of a female burial a copper mirror was found. The number of pots interned varies from three to 70 so far as extended burials containing human skeletal remains are concerned. In almost all the cases the number never exceeded beyond 20 except in case of the old chieftain who was given a ceremonial burial inside a mud-brick chamber or *Bhumigriha*. In his case 70 pots, many of them painted ones were interned and the body was laid over dishes or plates. In the burial of all types painted pots were rare. So far as the type of pots were concerned 'Lota' shaped

vase, always more than one, lids and bowls were a must, followed by jars, glasses and dish or cup-on-stand. Drinks loving guys, always males, were offered wine cups, in one case beautifully painted ones. Total absence of any wine cups in female burials indicates that social norms did not permit woman to enjoy intoxicating drinks as is the custom even these days in orthodox Indian families.

Wearing of shell or conch bangles by ladies is a very ancient Indian tradition and this has been amply proved through skeletal remains where the bangles have been generally found in the wrist region. Even today, the 'Lambadi' women profusely display such bangles in their arms and hands. For every married Hindu Bengali woman, wearing of conch bangles is a must as an auspicious sign. Total absence of any weapon of attack and defense from the burials at Kalibangan, signifies that the Harappans were a peace-loving people as they were leading a life of prosperity through ample agricultural product, plenty of trade in and outside the country. They had a well organized society, where rule and norms were strictly enforced by the intelligent governing body.

Existence of elaborate ritualistic pot burials of different types indicates that they had much respect for the departed ones in whose remembrance and honour, periodic rituals were performed with meticulous precision. At Kalibangan, disturbance of the earlier graves by later ones is of rare occurrence, as was the case at Lothal where a very limited area was available for burial ground, whereas at Kalibangan plenty of open and levelled ground in the desired direction on the left bank of Sarasvati, was available to be used as cemetery. Whatever disturbance caused to earlier grave was inadvertently and unknowingly and not due to paucity of virgin area. As the cemetery was of on the flood plain of the river, naturally flood waters levelled up the markings of the graves, generally in the form of tumulus and after deposition of fresh silt over them, they were not visible after few seasons, except those where some sort of more durable markings were placed. As the cemetery are was at a safe visible distance from the habitation, they could keep a watch 20 over grave-robbers (in search of precious material), if there were any. But evidence show that these days graves were not robbed as none of the pits them show any sign of robbers trench.

In case of extended human internments, how is it that in almost all were cases they appear to be burials of abnormal cases, i.e. of persons who died were unnatural death or of those who had one or the other pathological abnormality.[8] Skeleton No. 3, child was suffering from hydrocephally Trephination marks and the burning marks on the squamous temporal above the right acoustic meatus indicate that some primitive surgical

operation was performed. The child did not survive after the operation. The evidence of trephination for medical purpose at Kalibangan is the earliest instance of a surgical operation in the world going back to the middle of third millennium BC. Burning marks the were observed in case of skeleton Nos 5 and thirteen which appear to be cases of fire accident. Skeleton No. 6 was a case of a murdered man who was attacked with a copper axe. Left femur and tibia had sharp vertical cut marks on the inner side of the knee at the medical condoylar regions. The cuts were 3.0 is a cm deep and nearly 9.5 cm long. The wound did not show any sign of healing and indicating that the man did not survive the attack. Skeleton No. 8 was a case of a crippled man whose left hand bones were twisted due to deformity. Left radius and ulna were shorter by 2.8 cm and 3.6 cm respectively as compared to their had a right counterpart. In case of left foot bones, though all the metatarsal bones by the were present, phalanges were represented only be rudimentary bones. Skeleton No. 9 was a paralytic case. The body was dumped in the grave pit upside down with the head towards south as against the normal direction of north. Burial No. 12 which yielded three skulls along with fragmentary bones and one earthen relic casket containing molar of a child, was a case of burials of persons who probably died in an accident. Burial Nos. 4 and 12 were disturbed by other burial pits.

Now the question arises as to what happened to persons dying natural as death who obviously form the majority in any society? How their bodies were disposed of after death. If we look into the demographic survey of burials in the cemetery area at Kalibangan the number of extended type burials, most certainly containing skeletal remains, are far less as compared mater to the size and span of Harappan habitation at Kalibangan. In the cemetery, the area of extended burials and circular or oval pot burials are different. The pot burial area lies to the north of the extended burial area where as cases the large rectangular or oblong pits devoid of any skeletal remains, generally, down were found in the extended burial area. In all eighty-eight extended burials could be noticed, generally these burials were found in groups. In all sixteen groups of burials were plotted. Each group contained six to ten extended burials and at least one large rectangular pit. It appears that different groups were meant for different families. The area of each group was almost of the used same size. The large pits were left open which got filled up in course of time as is evidenced from the occurrence of thin and thick bands of clay and sand inside the pit, in the form of laminations. These pits contained only large lesser number of pots. It appears that these pits were meant for depositing the earthen pots after performing some sort of ritual connected with the disposal of the dead. Fourteen such pits were counted.[9]

The excavations at Kalibangan have revealed at least eleven to twelve phases of Harapan occupational levels. If each occupational level is accounted for nearly thirty years, then it could be said that the Harappan occupation at Kalibangan survived for nearly 350 years. This is corroborated by the 14c date (4040 + 105 and 3,165 + 110)[10] As per latest dates with MASCA corrections 13 the mature phase of Harappan culture at Kalibangan is c. 2600 to c. 1900 BC. Even if we take a modest view of five deaths as per annum in such a big settlement, it comes to nearly 1750 deaths in the span of nearly 350 years of Harappan occupation at Kalibangan. But hardly 100 extended burials are likely to be encountered in the cemetery located. The question arises whether there were more than one burial grounds which we have not been able to locate. Suppose this could be a possibility at Kalibangan then what about other Harappan sites. So far, none of the excavated Harappan sites have yielded more than one cemetery of the Harappan or period. Did the Harappans practice some other mode or modes of disposal of the dead, apart from the known practices of burial? In the absence of any other factor or evidence, the presence of a large number of circular or oval pot burials leads us to believe that the Harappans practised other mode or modes of disposal of the dead ones also. The other modes may be cremation and/or throwing the body in the waters of Sarasvati. Absence of any skeletal material or any trace of ash in the pot burials indicates that probably after disposing of the body only pots were interned in these pits.

In appears the practice of extended burial was adopted for unnatural cases, i.e. persons dying in accidents, murders and those who were looked down by the society as cursed ones on account of their deformities like case of crippled man, paralytic man, disabled man, etc. and for some important persons in the society. But, for the important persons in place of a simple oblong pits, special graves like the brick line one at Kalibangan, a wooden coffin at Harappa[11] in cemetery R.37, made of rose wood and deodar[12] were used. Persons disposed of otherwise who were definitely in greater numbers, cremation appears to be the likely mode of disposal for a larger section of the society and it is for this reason that we get, in all the Harappan sites, lesser number of extended human burials containing skeletal remains as compared to the size of the site and its population. Charred patches of earth and tiny fragments of charred bones, which remained exposed to the atmosphere, are hardly likely to survive after centuries.

If we look into the literary evidence we come across in *Atharvaveda Samhita*[13] a reference to a burial where the trunk of a tree was used as coffin. In chapter XVIII 2.25 it is stated "may the tree not oppress them, nor the great Goddess Earth". This is probably a reference to 'a coffin burial'.

Burials in different forms were known in India from very early times as mentioned in *Atharaveda* 5.30.14 (*manu bhumigraho bhuvat*) and 18.2.34-

ये निखाता ये परोप्ता ये दग्धाा ये च्योृिताः।
सर्वांस्तिनग्न आ वह पितह्नविज़े अत्तवे।।

O Agni ! bring all those *pitrs* here in order that they may partake of the offering, those (*pitrs* whose bodies) were buried or cast aside (*paroptah*) or burnt with fire (Agni - *dagdha*) or deposited above (on trees or in caves) *uddhitah*.

In *Ṛgveda* (VII 89. 1) the sage prays 'O Varuna ! may I not go the Earth House'.

In the *Ṛgveda Samhita* and *Atharvaveda Samhita* we find mention to a house of earth (*bhumigriha*) for burial. Burial No. 29 at Kalibangan, where the body and pots were laid inside the sun-dried brick chamber is an example of this of *Bhumigriha*.

Amongst Hindus, where due to some reason or the other the entire body could not be consigned to the flames, there is practice of *Mukhagni*, i.e. putting fire in the mouth and then disposing of the unburnt body by throwing it into the river. This process leaves burning marks on teeth, and at restricted places of mandible and maxilla. Burial No. 32 at Kalibangan is one of such cases.

Harappans were very meticulous about the location of the cemetery area. At Kalibangan it is located on the south-west of the habitation area, on the left bank of Sarasvati, far away from the living quarters and farthest from the sacred, religious spot at KLB-3, where large number of fire places were located.[14] It is an open ground where the sun shines directly on it, and it slopes towards the north. The water flowing from the river and the wind blowing from north-east passes through the cemetery only after they had crossed the religious and habitational areas. Being an and land there is high percentage of salt in the soil which gets deposited in the form of white patches over the ground.

Satapatha Brahmana[15] prescribes a four corner mound facing south-east, ground inclined to the north, out of sight of the village, in a peaceful spot amid beautiful surroundings or on barren ground. In *History of Dharmasastra*, Kane describes, "the site of cremation should be surrounded by a thicket of trees, but it should be so open that the sun shines directly on it at mid-day. It should be saltish land or land sloping to the north or it may be all level ground."

All this I have mentioned not because I wish to state that the Harappan way of disposal of the dead was guided by the norms laid down in the above mentioned texts, which many scholars still believe to be of late

creations, but to point out that traditions die hard and in India oral traditional had been traditions, that passed on from generations to generations, from remote past. While analyzing the results of the excavations we should not be guided only by the theories propounded by earlier scholars but must keep our minds open to various oral traditions, ancient texts and present day practices in the society. With the advancement of research many theories which were taken for granted have proved wrong.

Classic examples of how misinterpretations of field data and morphometric data can leads to incorrect conclusions have been shown by kennedy.[16] (1982). So-called massacres at Mohenjo-daro – Chatterjee and Kumar[17] (1973) ascribe certain incomplete and distorted burials found in the ruins to the aggressive acts of invading Aryans, a view proposed earlier by Wheeler (1952).[18] 14 Dale[19] (1964) argues on archaeological grounds that actual dates for the Harappan Civilization and the arrival of Aryans cannot be established. He goes on to note that armed invasion is not indicated by the presence extensive destructive levels at the site, that there is no evidence that the skeletons belong to a single period of time and therefore no proof of a single tragedy, and that only two of the skeletons bear evidence that a massacre had occurred at their place of deposition. Finally, weapons and armour are not associated with any of the skeletons.

Another classic example is Guhas[20] (1935) attempt to account for the low incidence of mesocrany and brachycrany in Harappan cranial series by hypothesizing the intrusion of foreign racial elements. Although there has been an awareness for some three quarters of a century that changes in cranial form are reflective of environmental shifts of which nutritional stresses are perhaps most important in affecting growth (Boas, 1912),[21] the use of the cranial index as a guide to population identity continues to be used by some writers up to the present time. One is also aware that brachycranialization had continued as an evolutionary trend in world populations during the past 10,000 years. Brachycrany which is evidence in low frequency in cranial specimens from Harappa and Lothal cannot be cited as a hall mark of racial identity for segments of those populations once one understands the demographic distribution of meso and brachycrany beyond the Himalayas.

Cappieri (1970)[22] writes:-

1. There is no evidence of brachycephalic populations in the period covered by my study (the Harappan period) which might have influenced the local fundamental dolichocephally, and
2. There is no element proving migration of population from one region to another in the period mentioned. I calculated for the 11

> essential characters 469 differences of mean between each local series of crania and all the others, mutually and inversely. Most difference - 83.4 - were 'not significant' and such a high value proves the genetic and somatic homogeneity of all these (specimens) as a simple population.

Recognition of the evolutionary fact of brachycranialization bears upon the question of the biological identity of the ancient Harappans who, it so now appears from multivariable analysis, were a relatively homogenous a population (Dutta, 1972)[23]. The so-called foreign elements are better attributed to immigration of rural peoples or, possible nomadic groups coming in from outlying Harappan towships, hamlets and grazing areas. One recognizes a biological continum of many of their morphometric variables in the modem populations of Punjab and Sind. Harappans were a relatively stable population inhabiting the northern and north-western sectors of the Subcontinent for several millennia prior to their climatic movement of urbanization and commercial influence.

Allchin (1982)[24] rightly says, "The Indian civilization arose on, Indian soil as an organic process it was not primarily superimposed from outside, even if external stimuli may have contributed." According to the latest researches by Alan R. Templetor, professor of biology in Arts and Sciences at Washington University, genetically, race does not exist in humans. After analyzing DNA from global human populations that reveal the patterns of human evolution over the past one million years, he has shown that while there is plenty of genetic variation in humans, most of the variation is individual variation. In his paper titled "Human Races: A Genetic and Evolutionary perspective"[25] he says that while between population variation exists, it is either too small which is a quantitative variation, or it is not the right qualitative type of variation – it does not mark historical sublineage of humanity. Using the latest molecular biology techniques, Templeton has analyzed millions of genetic sequences found in three distinct types of human DNA and concludes that, in the scientific sense the world is colour-blind. Race is a real cultural, political, and economic concept in society but it is not a biological concept. His results showed that 85 per cent of genetic variation in the human DNA was due to individual variation. A mere 15 per cent could be traced to what could be interpreted as 'racial' differences. The 15 per cent is well below the threshold that in used to recognize race in other species.

Before the discovery of bones of Equus caballbus Linn, i.e. true horse at Surkotada (a Harappan site in Kutch), and later on at Kalibangan, all earlier scholars – both archaeologists and zoologists have firmly believed

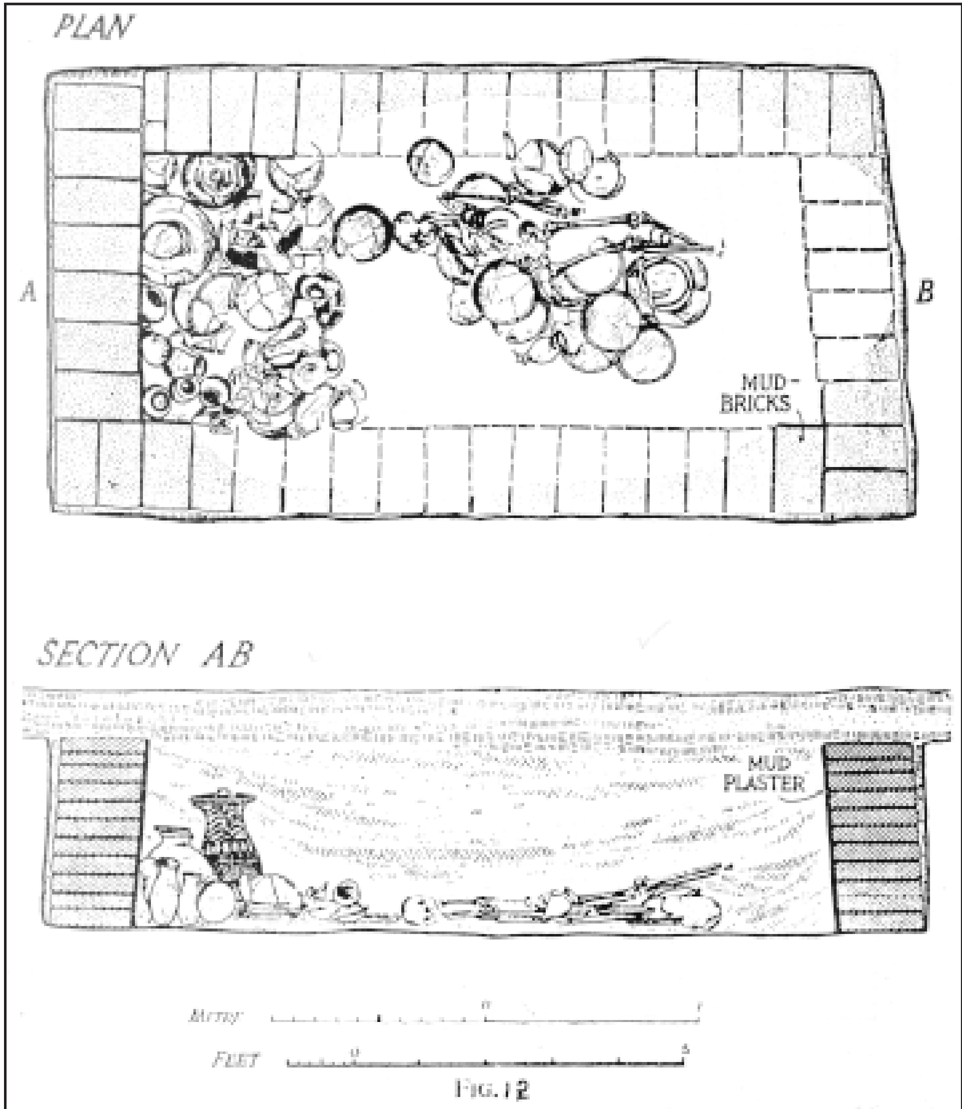


Fig. 1.

that true horse was not known to Harappans and it was introduced in India by so-called Aryans who invaded India and over powered Harappans. But even after half a century of this theory, the discovery of horse bones has conclusively proved that the earlier findings and results were totally erroneous.[26] So in case of disposal of dead by Harappans there is no harm in accepting the facts, as in the cemetery area at Kalibangan charred patches of earth, clear evidences of burning,[27] were noticed but unfortunately ignored.

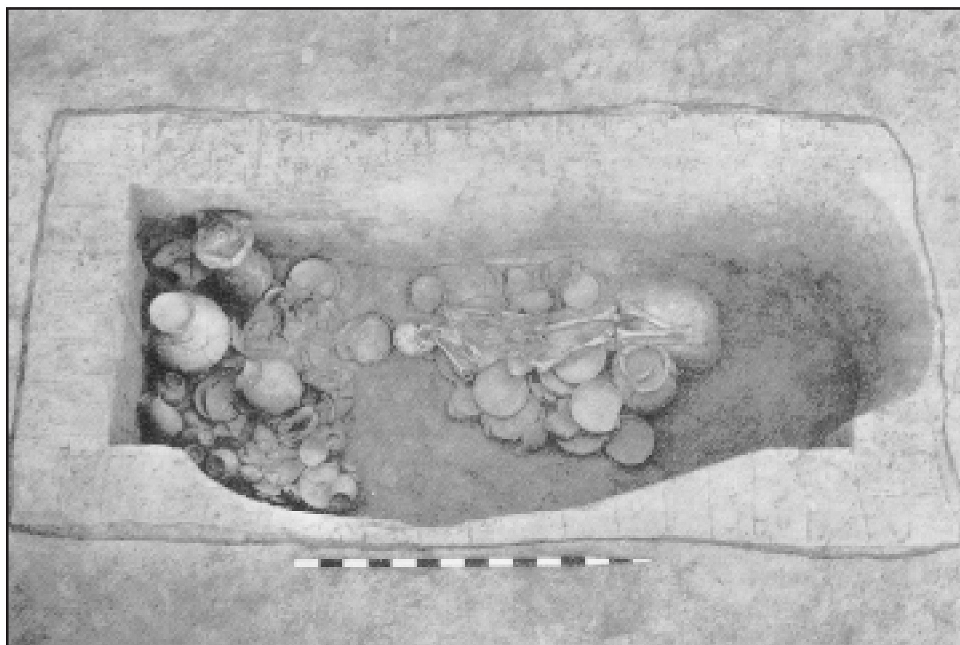


Fig. 2.

In order to have better and fuller knowledge regarding disposal of the dead during Harappan times and related social customs, it would be worthwhile to locate the cemetery area in some important Harappan site, like Dholavira, meticulously map the whole area and expose a fairly large number of burials. Detailed study of skeletal remains apart from telling about the morphological composition of the society, would be useful for making palaeopathological studies.

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16

GVC to IVC to SVC (Ganges Valley Civilization to Indus Valley Civilization to Sarasvati Valley Civilization)

K.V. Ramakrishna Rao

Introduction: India was known as the land of sacred rivers flowing and its ancient civilizations were on the banks of such sacred rivers continuing with the life of Indians since time immemorial. Thus, the Ganges Valley Civilization (GVC) had been the ancient one. Indians have been so fascinated that they depicted Ganges in the art figuratively, which has been interpreted geographically by V.S. Agrawala,[1] as such sculpture depicts visual representation of Madhyadesha! In fact, the European intelligentsia was searching for the human origins on the banks of the Ganges only.[2] The name 'Ganga' has been so famous that it is found in the names of rivers in China and SEA countries also.

It was Jean Sylvain Bailly (1744-1844)[3], who shifted the origin of human race from Greenland to New Zenyla to Ganges Valley, according to his astronomical calculations. He also explained that arts and sciences were developed only there. Here, actually, the concept of origin of human race located at the Arctic region was changed to Ganges Valley. Voltaire[4] also accepted such origins. Drawing attention to the books of John Zephaniah Holwell and Alexander Dow, he concurred with him that all of their arts, including astronomy, astrology, the concepts of birth and death etc., were derived from the Ganges Valley. Later Pierre de Sonnerat[5] concluded that it was India that gave the legal system to the humanity and therefore, origin of humanity. To Guillaume-Thomas-Francois Raynal,[6] India, not the Middle East, was the earliest inhabited part of the globe and the Indians were 'the

first who received the rudiments of science and the polish of civilization'. Immanuel Kant, Johann Gottfried Herder and others too had such views.

However, they continued to attribute such wisdom, knowledge etc, to a particular group of Indians, Brahmins,[7] which resulted in anti-Brahmin tendencies later. Moreover, the pro-Hindu support of the European intelligentsia had turned into anti-Hindu, as when the question of faith came into play. To quote, P.J. Marshall, "Joseph Priestley (1733-1804),[8] the greatest scientist of the late eighteenth century, came to the defence of Moses, as Newton had done at the beginning of the century." So also Isaac Newton[9] and the host of European scientists started turning against India.[10] Thomas R. Trautmann[11] has also pointed out such defences of Moses of Newton and Jacob Bryant.

Martin Priestman[12] delving upon the subject matter later, recorded as follows:

> The brief Remarks of Dupuis were published as a pendant to Priestley's more ambitious. 'A Comparison of the Institutions of Moses with those of the Hindoos and other ancient Nations' (1799). Drawing largely on Sir William Jone's Asiatic Studies (particularly, Institutes of Hindu Law, or the Ordinances of Manu and Dissertations and Miscellaneous Pieces relating to the History and Antiquities, the Arts, Sciences and literature of Asia), Priestley demonstrates impressive if nearly acquired mastery of the rapidly expanding field of Orientalist knowledge which, if not carefully patrolled, might leads to all kinds of marginalization of Christianity by comparison to other cultures and belief systems. This danger is represented by another Frenchman, Langles, who sees 'the religion of the Hindoos' as the source for 'those of the Egyptians and Jews who have done nothing but ape the latter, of the Chinese, of the Greeks, of the Romans, and even of the Christians'. The five books of Hindu Vedas are the prototype of 'the five books of Moses, who... only copied Egyptians works, originally from India'. Furthermore, Langles accepts a non-Mosaic chronology where by 'many thousands of years before' the Egyptians, or Jews 'formed themselves in societies, or ever thought of forming a religion, the civilized Indians adored the supreme Being, eternal, almighty and all-wise, divided into three persons, (*Works*, XVII, pp. 139-42, 324).

As for as the chronology of India is concerned, Martin has recorded very clearly:

> On the chronological question, Priestley again invokes the authority of Newton as well as detailing Jone's determining efforts to reduce enormous time of Hindu mythical history to proper Mosaic proportions.

Thus, the Indian chronology was the worst affected, because of their racial superiority, professional prejudice and Christian bias. Thus, the historical research on India was turned into religious one and all ganged up against India and the historical meddling started. Thus, the *Romantic atheism* had turned into *Romantic anti-Indian history*. Politically, at another side, that had led to the creation of race hypotheses and theories. The more they tried to equate themselves with the Brahmins,[13] the more anti-Brahmin tendencies developed turned into anti-Brahmin hatred and hostilities.[14] Incidentally, very often, they used to delve upon the Brahmins in their discussion,[15] of their Indo-European interpretations. Even Chinese stick was used to beat India[16] irrespective of the subject dealt with.

After the discovery of Indus Valley Civilization (IVC), the attention of the scholars turned towards IVC. As Indians were divided, the sacred land divided and the rivers got separated with the new boundaries drawn, the civilization itself was divided and separated. However, divided people continued to read the combined history for some time. But the Mohammedan fundamentalism worked differently and *5000 years history of Pakistan: An archaeological outline* was written by Mortimer Wheeler (1890-1976)[17] in 1950. Now, Pakistanis started asserting that IVC has been their civilization and India cannot claim any right over it. In fact, it objected to the starting of Indian history from IVC in the schools and college text books. Though, historically, it is incorrect to divide any one civilization into two, it has happened. Historians, archaeologists, excavators, IVC experts and others have been in the bliss of stupor acting according to such myth created. Everybody knows Pakistan of 1947 had two parts – East Pakistan and West Pakistan. Then, naturally, all Pakistanis would be reading the same history starting with IVC, just like Indians. But, what would have happened after East Pakistan becoming Bangladesh in 1971? Naturally, when Pakistan asserts that Indian cannot start her history with IVC, so also, Bangladesh! But, the historians, archaeologists and others have never bothered about it.

Himalayan Valley Civilization: In fact, all the rivers – Ganges, Sindhu, Sarasvati, Brahmaputra and others originate from the Himalayas and flow down to the valleys reaching the oceanic and sea waters of the east and west. Thus, it is evident that the ancient Indians could have conceived, perceived and established a 'Himalayan Valley Civilization'. As geology works and geography changes because of the plate-tectonic processes and ecological imbalances, the changing directions of the flowing rivers, disappearance of rivers, encroachment of sandy tracks of the rivers by the people with the expansion of population and urbanization, many changes have been taking place even today in India, particularly connected with

the places, which have history more than 5000 years. Therefore, it might not be an imagination to conceive that initially, there had been a single great river flowing and then with the rise of Himalayas, the river got divided in the sense, waters flowing in different directions, thus flowing in different routes altogether. In due course of time, they were identified separately with the names assigned to them by the people of the culture, tradition, heritage and civilization. In whatever way, at present scholars interpret, the fact remains that the antiquity of all these civilizations goes back to c. 9000 to 6000 BCE based on the archaeological dating. The Brahmaputra Valley Civilization has not been studied properly and it could be much earlier than others also.

The Antiquity of Ganges Valley Civilization (GVC): Interestingly, rice, the staple food of India has been found in the later levels of IVC dated to 2000-1500 BCE, whereas, in the Ganges Valley, it is found at the levels dated to c. 6000-5000 BCE. The Lothal evidences have already been dated to c. 2300 BCE. This clearly points to the fact that the rice based culture could have spread only from the Ganges Valley Civilization (hereinafter mentioned as GVC) to the IVC and not the other way. Incidentally, it has to be noted that the European intelligentsia, when tried to locate the oldest civilization on the earth for the purpose of origin of human race, they could find Chinese and Hindus[18] having civilizations continuously since time immemorial. However, they decided to follow the Indian pattern, when they attempted to come out of the Judea-Christian model. So the praise of Indian/Hindu civilization increased with the production of articles, papers and books. Leon Poliokov[19] and P.J. Marshall[20] give many references in this regard.

However, the orthodoxy and dominant group did not want to give credit to India and thus, the reversal started taking place, i.e., discredit, denigrate and disparage anything that was India. This trend could be seen in the writings of the Jesuits, John Bentley, Vincent Smith and others. Therefore, this has to be noted by the Indian scholars of all fields. If new evidence throws light for such, it can be accepted, but just for religious dogma, theological fundamentalism and pursued ideology, if historical facts are changed or made upside down or reversed periodically, it cannot be accepted. The shifting of support from GVC to IVC had been only due to the fact that it was near to the other middle-eastern civilizations suitable to their assumed Mosaic chronology. Moreover, after partition, the scholars played havoc purposely, as could be seen in their altered affiliation. When Ganges has been predominating and dominating all psycho-somatic processes of Indians, how is that they never thought of such civilization?

As H.D. Sankalia[21] points out in the densely populated areas and towns, the archaeologists could not carry out horizontal excavations to get complete details about the human activities and their deposits. Pointing out that there is no evidence to prove that Chandragupta Maurya, Asoka and other ever walked on the roads of their cities, he urged that excavations had to be carried on at the sites connected with *Ramayana*. But now in India, if anything said about Vedas, *Itihasas* and *Puranas*, immediately, it is dubbed as communalism and ignored accordingly. Even the important findings of S.R. Rao in the case of Dwaraka,[22] B.B. Lal in the case of *Itihasas*[23] have been neglected and ignored by the Indian historians.

Recently Dorian Q. Fuller[24] has made an inter-disciplinary study of the agricultural origins and frontiers based comparative method. He used the accumulation of recent data from archaeobotany, archaeozoology and Neolithic excavations from across South Asia warrants a new overview of early agriculture in India (the westerners mention as the subcontinent, with truncated map). Reviewing the evidence for origins and dispersals of important crops and livestock from South-west Asia into South Asia, evidence for indigenous plant and animal domestication in India is presented. The important feature has been a review of evidence for probable indigenous agricultural developments in Gujarat, the Middle Ganges, eastern India, and southern India. The study of interaction between early farmers and hunter-gatherers based on the current evidence suggests that the Neolithic trajectories in different parts of South Asia differ from each other. Indigenous centres of plant domestication in India also differ from the often discussed trajectory of South-west Asia, while suggesting some similarities with agricultural origins in Africa and Eastern-north America as well as secondary agricultural developments on the peripheries of Eurasia. As discussed above, the antiquity of rice in the GVC makes the picture clear about India.

The French Institute of Pondicherry has engaged in the study of Palaeoenvironments in south India in Biological, Geological and Historical perspective.[25] Their palaeo-reconstruction of Niligiri hills gives a scale for the stratigraphic study and dating, and the gap around 3000 BCE is assumed to be corresponding with a flood. Interestingly and significantly, that gap coincides with 3102 BCE, the date corresponding to the starting of Kali Era, which has been discussed and debated by many European scientists, mathematicians and astronomers.[26]

Dating problem of the Civilizations: Maxmuller's dating of Indian scripture[27] has been very funny by assigning 200 years to Sutra period, Mantra period and so on. William Jones[28] has done in his own way. The

missionaries did their maximum in reducing the Indian chronology to fit within the biblical chronology.[29] Though IVC evidences go back to c. 9000 BCE based on Mehergarh excavations, the dispute about the association, correlation and corroboration of Vedic literary evidences with IVC is still unsettled, as it is linked the with the decipherment of Indus script. But, now as the archaeological evidences of GVC with usage of domesticated rice and other cereals take the antiquity to c. 6500 to 6000 BCE/ c. 8500 to 8000 Yr. BP, the Vedic literary evidences can easily be associated, correlated and corroborated and moreover such sites have been on the banks of Ganges only. The Iron usage of the same region also places its antiquity before c. 1800 BCE.[30]

Pre-Mauryan archaeological evidences: The mounting archaeological evidences recovered during the last sixty years have not been incorporated into the Indian academicia, particularly in History text books. Incidentally, the new sites are dated to pre-Mauryan, because of the stratigraphical alignment. Some examples are given:

Lauriya golden woman figure (c. 8th-7th cent. BCE): According to the indologists, the earliest Gangetic valley evidence, a golden tablet depicting a naked woman standing on her legs in symmetrical rigidity, with exaggerated hips and sexual organs, heavy and clumsy ornaments and in a rigidly angular composition. It was reportedly dug out of a tomb near Lauriya identified by Bloch,[31] who ascribed it to 8th or 7th century BCE.

Piprahwa golden woman figure (c. 450 BCE): A small gold tablet similar to the above found as a part of the relics from the ruins of Piprahwa Stupa.[32] Incidentally, the Piprahwa findings have been involved with forgeries and manipulations.

Manipulations of Piprahwa Findings[33]: Dr. W.C. Peppe's discovery[34] of Lomas Rishi cave/stupa with Buddha's relic casket near Nepal border in 1898 created a great sensation among the British. About the dating of the monument, there was controversy among them. Fergusson[35] dated to c. 250 BCE. Vincent Smith[36] wanted to give round numbers of '450 BCE' for good reasons. Fergusson noted that the Sudama or Nyagrodha cave is the oldest architectural example in India dated to 250 BCE, whereas, Smith asserted that, "The earliest building to which an approximate date could be assigned is the stupa at Piprahwa on the Nepal frontier, explored by Mr. Peppe in 1898. Very strong reasons exist for assigning this building to 450 BC."

These are old examples and the recent ones are discussed as follows:

Sisupalgarh excavations at Orissa (pre-Mauryan): Incidentally, the Sisupalgarh excavations take the stone monuments to a pre-Mauryan period. Researchers[37] involved in excavation at the ancient city of Sisupalgarh on

the outskirts of Bhubaneswar have come across a number of artefacts and structures that throw light on the existence of a flourishing urban life during the prehistoric period. The geophysical research showed large-scale patterns of subsurface architecture such as streets, which were visible linking the gateways in the interior of the site, and a large ancient perimeter area around the pillar zone (18 in number, see photos below).

Dating problem: According to Mohanty, an archaeologist, it seemed to be a large city, which could have been governed under one ruler, with the ancient population inhabiting the place was estimated to be 25,000 and the civilization could have lasted for more than 1,000 years between 3rd BC and 3rd AD.[38] But, it is evident that calculation error could be there, as 'between 3rd BC and 3rd AD' (600 years), the civilization could not have existed 'more than 1,000 years'. In other words, 'the more than 1,000 years' old civilization could exist 400 years before that period, i.e., around 700 BCE. As stone monuments are dated on comparative dating method, they always put within the Mauryan period.

Researchers working on the place adjacent to a 'majestic gate' excavated by Prof B.B. Lal[39] in 1950, found house foundations of laterite block architecture and the habitation areas also contained very large quantities of household pottery such as bowls and jars along with other household artefacts such as iron nails and terracotta ornaments including bangles, finger rings, pendants and ear spools.[40]

Pointing out that the latest debris deposits and pillars indicated that it was meant for public use, Monica Smith, anthropologist said the ancient artisans at Sisupalgarh were manufacturing potteries massively and those were in rapid use, adding that the people, animals and trash were closely integrated in the crowded space of the city and they might have practised the same wasteful consumption which is witnessed in the modern day cities.

The pillars have been evidently unfinished or roughly made with provision for holding roof and superstructure. The monolithic structure shown on RHS has also been unfinished suggesting that work undertaken might have been left. In any case, the pre-Mauryan stone-art and work clears the myth that such stone art originated or developed only after Asoka, that too copied from Achamenean or using their workers.

The transition from wood to stone in Indian art and architecture: The myth has been created that the existence of pre-Mauryan art mainly practised in wood and partly in sundried brick, clay, ivory, metal and mineral stone, and this art could hardly conceive life and things in proportions and large dimensions.[41] Such myth has been mystified with another myth[42]:

> On the other hand the wealth of human figures in post-Maurya art is to be explained by the assumption of the existence of an art in pre-Maurya India in which men and women must have played an important role, and which was un-Aryan in ethnic character and ideology. The human figure which came later on to be the main exponent of Indian art of the classical and early medieval periods. Considered from this point of view, appears to be the gift of un-Aryan southerners of India.

This has been completely racial interpretation bringing such bias even in the interpretation of archaeological evidences, which is intriguing. It was Fergusson,[43] who created the myth that

> India owes the introduction of the use of stone for architectural purposes to the great Asoka, who reigned from about BC 265 to 228... Indians employed wood and that only,[44] in the construction of their ornamental buildings before Asoka!

This has been questioned seriously by Vedaprakash[45] and exposed the baseless hypothesis planted by Fergusson, as it makes Chandragupta Maurya, an illiterate and wooden-dwellers, whereas, his great son, Asoka the Great, a rock-dweller!

Chandraketugarh, Piyali, 24 Parganas (pre-Mauryan): Excavation of a new site on the banks of Piyali riyal in south 24 Parganas district (situated 38 km north-east of Kolkata), West Bengal unearthed evidence of human habitation 'dating back to the 3rd century BCE and before'.[46] Gautam Sengupta, the West Bengal Archaeology and Museums Department director reported that they discovered the site recently and came across some terracotta articles, copper coins, stone beads and other artefacts and the new site is on the banks of Piyali, which is again a part of the river system of Vidyadhari, on the banks of which Chandraketugarh was discovered in the early years of last century and Chandraketugarh's history dates back to almost 3rd century BC, 'even before the Maurya dynasty came up'. The archaeological significance of the Chandraketugarh area came to light in the early years of the last century when road-building activities exposed a brick structure and artefacts. The new site at Tilpi could be linked to Chandraketugarh, 'the pre-Mauryan site'. But the state archaeology department is worried that relic hunters are already removing artefacts from there and smuggling them abroad. This is an important strategy adopted by the vested groups that smuggle out 'only pre-Mauryan artefacts'. How then, the research carried out by the art-historians or any historian would be complete without study of such artefacts? Ironically, they not only do not mention such illegal activities, but also conclude many things in their researches and books as final!

The pre-Mauryan Lion head: ASI mechanic Siddheshwar Prasad accidentally came across the stone lion head on the dry river bed on February 18th, 2008, when he went to the Collectorate Ghat for a wash. He told TOI[47] that when he saw this huge antique (around 50 kg), he carried it to the ASI's Anta Ghat-based office, there archaeologists were baffled by the discovery of a 'pre-Mauryan period' lion head made of stone from the dry bed of the Ganga. This was made possible as the river has changed its course in recent years exposing its dry bed. According to an expert, "the one-and-half-foot stone artifact is similar to those of Greek sculpture". P.K. Mishra, Superintending archaeologist (Patna Circle), ASI, admitted that the lion head, in all likelihood, "could symbolize the Mauryan royal palace structure" adding that "its hairstyle, eyes and moustache were similar to Greco art". He also informed that a team of archaeologists led by him would visit the site to explore the area and find out whether more such antiquities were buried there. If required, they would make a preliminary excavation at the dry river bed to find out more details. However, the comments of the expert and the Superintendent archaeologist, ASI have been typical, as they are dating the finding based on style and comparative method, instead of any independent dating method. Having decided that it is pre-Mauryan, why it should be similar to Greco art? In fact, the other way is also possible. Thus, it is evident that there has been a mental block in the minds of researchers, archaeologists and historians in India and elsewhere.

Even Ivory statuette dated after Mauryan!: The dating of Indian artefact after c. 300 BCE has been consciously working without any rationale, but purely based on mythi-story floated by the Indologists. To cite another example, the material evidence – the so-called Sri or Lakshmi, the ivory Indian statuette recovered from Pompeii. The scholars[48] vaguely note that "it might be dated somewhere between the end of the first century BC and the start of the first century AD". However, the simple facade from where this was found has been dated to the Samnite era (3rd-2nd cent. BC). And what about the artistic standrards of the statuette? To quote[49], "On the whole, the statuette provides evidence of remarkable workmanship, for the graceful movements and the calm expression of her face." Thus, the bias of dating anything Indian after c. 300 BCE is evident and it is nothing but a myth without any basis. Therefore, such myth in history cannot be accepted. The statuette could be dated to pre-Mauryan period, i.e., before 300 BCE.

As they themselves repeatedly recorded that in the pre-Mauryan period only wood, ivory, brick, clay, etc. were used, but not stone, the dating of ivory-statuette to the pre-Mauryan period is the most appropriate. Though, such mythi-story in history is not accepted, i.e., the pre-condition that after

Asoka stone should have been used, before Asoka no stone should be used, the contradiction in their dating method is pointed out.

Interestingly, the woman depicted has been adorned with many ornaments – headgear, a drop on the forehead, earrings, necklaces with pendant, waist-grid, hands and legs covered with bangles. Not only the woman, but also the two attending ladies, on both sides carrying perfumes or soap, wear similar ornaments. So all women were treated with equal. Did any woman wear all such ornaments before 300 BCE? This implies that before 300 BCE, the women of India were wearing all such ornaments and such technology was there for the manufacture. Coming to the ivory carving, it had gone from India to Italy, i.e., the Italians wanted it from India, as such artefacts must have been popular even in those days. Therefore, this again proves the wrong dating of material evidences without any logical correspondence between the material evidence and cultural evidence.

Rice cultivation and its spread: Scholars[50] so far had been interpreting that the rice cultivation associated with BRW ware technique had spread from Lothal to other parts of north-India.

S.R. Rao points out that in Surkotada, charred lumps of carbonized seeds were found in an earthen pot and they were identified with *genus Setaria* (millet) similar to *Setaria viridis* or *S. Verticillata*. Wild grasses of *Andropogon*, *Brachiria*, *Peenicum*, *Echinochoa* etc., were reported from late levels. Among seeds, the *Scirpus* (glumeless nuts) and *Amaranthus* sp. are noteworthy. Rangpur[51] and Lothal[52] have yielded evidence of rice and *bajra*. Thus, he concludes[53] that, "the earliest occurrence of rice in India is at Rangapur and Lothal in the mature Harappan levels and obviously, horse and rice must have been known to the Harappans as early as 2200 BC."

Up to the 1950s, the oldest excavation of rice was found at Hasthinapur (U.P.) dated between 1000 and 750 BCE (Ghose *et. al.* 1960). The often cited Chalcolithic sample of rice dated to 4500 BCE. A 1980 report on excavation made in Koldihwa at Mahagasra (U.P.) pushed the date back to 6570-4530 BCE. The rice grains appeared to be of a cultivated type (see Chang, 1989).[54] Kharailal Mehra and others working on the Ganges Valley Civilization show that antiquity of rice could go to c. 5000 BCE based on the samples found there. According to Rakesh Tiwari,[55] the samples found on the Ganges Valley at Lathuradeva in Sant Kabir Nagar go to c. 6000-5000 BCE, adding that the dates 6th and 5th cent. millennium BCE are also the earliest indication of human activity in the Sarayapur area of mid-Ganga Valley. Thus, the antiquity of GVC going before IVC has been very significant.

Interpretation, correlation and corroboration of Vedic and IVC: The expert scholars, professional archaeologists and eminent historians differ and appear to differ on the question of interpreting, correlating and

corroborating the evidences of IVC with that of Vedic and vice versa.[56] Now, they know very well that the spread of such culture and civilization is not restricted to the Indus Valley, but beyond.[57] The Indus-like cultural artefacts found at the sites of east of Indus river, particular on the disappeared and underground Sarasvati River[58] and even extended up to Ganges alter the picture of the extent of such civilization. The people with identical material culture living far and wide point to the contemporneity or displaced condition. As the interpretation, many times depends upon secondary dating methods, racial, linguistic and other biased thinking make scholars to take different stands. Even after noting the continuation of food and farming pattern in India, it is ironical that they should interpret differently, because of changed conditions[59] after 10,000 to 5000 Yr. BP.[60]

The disappearance of Sarasvati is linked with the Sindhu and Ganges river system, as it was flowing and as well as and connected with those systems. The change of direction of flowing rivers, appearance and disappearance in their flowing paths and directions during the course of period of time has been in accordance with the plate tectonic movements.

If the literary evidence of Balarama' pilgrimage on the banks of Sarasvati up to Mathura is taken as evidence, then, Sarasvati must be flowing around c. 3100 BCE and thus it must have disappeared thereafter. Such event must have been due to a severe tectonic movement associated with submergence of land-mass at the mouth of the rivers, i.e., Rann of Kachchh. Incidentally, the Dwarka and Khumbat excavations that give new evidences have been exactly in that area.

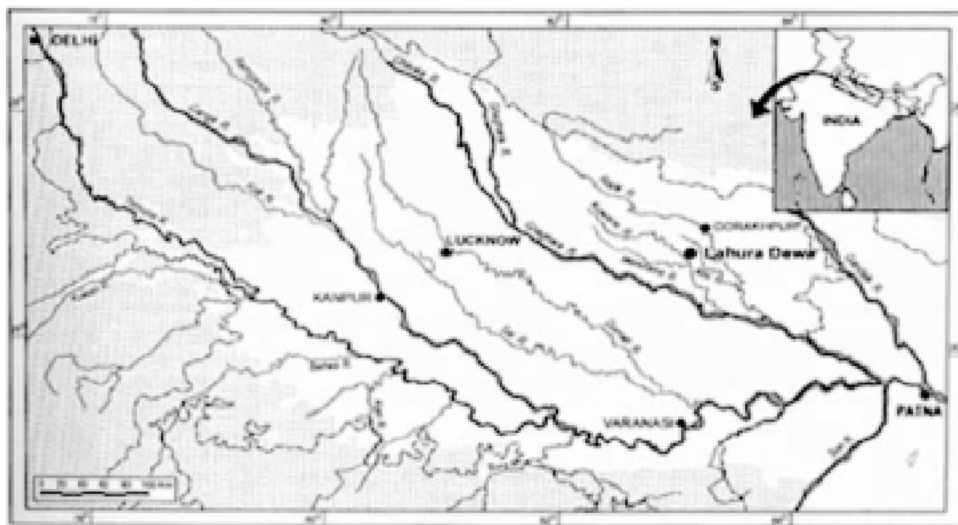


Fig. 11.

The above figure is from Valdiya[61] and the below from Rakesh Tewari and others.[62]

Dating of the Coins: The dating of the Indian coins[63] has been made on comparative or relative method, mainly comparing with the Brahmi script reportedly used by Asoka. Thus, the dating of the coins would be within the 'sheet anchor chronology'. However, applying the stratigraphical principles of archaeology, when punch-marked coins were found, they were dated to 9th century BCE. For example, when G.R. Sharma[64] conducted excavations at Kausambhi during 1957-59, he could discover punch-marked coins at the second cultural period marked to 885-605 BCE. In fact, Altekar[65] dated to c. 2500 BCE, refuting Elliot[66] and Bhandarkar.[67] A.L. Basham, C.L. Fabri[68] and others have pointed out as to how the IVC symbols continued in punch-marked coins. K.D. Sethna, Vedaprakash, A. Sundara and others have shown as to how the IVC art-form continued to Mauryan Empire through the intervening civilization. Thus, A. Sundara assigns Asoka to c. 1200-1000 BCE based on archaeological evidences and K.D. Sethna to c. 750 BCE. The archaeological dating of Asoka to 13th-8th centuries reinforce the identification of two Asokas by the scholars.[69] Therefore, scholars could consider the possibility to bridge the gap between the IVC and Mauryan periods, so that the Indian historical processes could be explained satisfying all the existing evidences of archaeology, numismatics, epigraphy etc., at one side and literary evidences – Vedas, *Itihasas*, *Puranas* at the other side.

Buddha going before Buddhism: Just like Jesus going before Christ or vice versa,[70] in the case of dealing with the saviour-myths, there have been references found that Buddha going before Buddhism and vice-versa. This exactly answers the lacuna of Indian lotus appearing in the Egyptian sculptures.[71] Another evidence has been that a Buddha sculpture found in the Luxor temple, Egypt.

It is shown on LHS. This has copied from the video CD sold by TABA Group of Companies, Egypt to the visiting tourists.[72] This clearly proves that either the date of the Egyptian temple should be before Buddhist period or the Egyptian sculptures might be contemporised with the Buddhist period. In any case, the vast gap of thousands of years cannot be explained by the presence of the sculpture. As the fact being that Buddhism was there and the archaeological evidences might not be dated differently, as such datings pose questions that are not answered by the historians.

In fact, baffled by the Buddhist strong presence in the Middle-east up to Egypt, the Indologists tried to play down the evidences found there. They indulged in petty hypotheses that Buddha image was derived from

the Greeks and so on.[73] Ananda K. Coomaraswamy, Radha Kumud Mookerji[74] and others[75] had refuted their biased writings. Here, there is no question of nationalist interpretation or otherwise, but the scientific method of dating of stone sculptures and the technology behind it. Thus, coming to the Indian Lotus, if the Egyptians copied the image from Indians, then, their chronology cannot go before Indians. However, as the Indian history starts with Mauryan period, i.e., c. 300 BCE, whereas, the Egyptian history starts by c. 3000 BCE, the lacuna has to be explained, as otherwise, the Newton's finding that[76], "the 300 years expanded chronology of the Greeks and 3000 years of that of the Egyptians," may have to be accepted.

Lomas Rishi Cave (dated to c. 450 BCE): The Loma Rishi cave has been the centre of controversy even today,[77] whether Indian scholars, historians and archaeologists want it or not. The photos taken by Thomas Fraser Peppé are depicted below[78]: The British Library gives the note as follows:

> Photograph of the sculptured doorway of the Lomas Rishi cave in the Barabar Hills, Gaya. Caves in the twin Hills of Barabar and Nagarjuni date back to the 3rd century BC, Maurya period and represent some of the earliest example of rock-cut architecture in India. The Lomas Rishi Cave was carved out a huge rounded granite rock and has an arch-like shape façade imitating the contemporary timber architecture. The internal surface is highly polished. The sculptured doorway imitates wooden architecture. A frieze of elephants proceeding towards stupa emblems is sculpted along the curved architrave.

So, it is not known how the dating of Vincent Smith of 450 BCE is forgotten or ignored cutting down is chronology. The wooden-imitation myth is woven in the description. It is evident that the forged Asokan inscription is taken into account to comment that the cave is dated to Asokan period and this is totally unacceptable. It is ironical that Indians are made to forget what happened in 1898. When the announcements were made about the Peppe's accidental finding, a German archaeologist named Dr. Alois Anton Führer, who had visited the Piprahwa dig, was found to have falsified evidence at another excavation site only a few miles away in Nepal. It was then found that Führer had a history of archaeological fraud and he was dismissed (discussed below). The scandal cast a cloud over the Piprahwa discoveries which have never been lifted. Moreover, they do not give the full description of the site, other monuments found there etc., which are discussed here in the context.

The assertion of Vincent Smith[79] is reproduced here for analysis, as it involves a crucial dating in Indian history:

> *The earliest Indian building.*
>
> The earliest Indian building to which an approximate date can be assigned is the *stupa* at Piprahwa on the Nepāl frontier, explored by Mr. W. C. Peppé in 1898. Very strong reasons exist for assigning this building to 450 B.C. in round numbers, shortly after the decease of Gautama Sākyamuni, commonly known as Buddha. The edifice, which was almost perfect when opened, is a solid cupola, or domed mass, of brickwork, 116 feet in diameter at the base, and about 22 feet high, built round and on a massive stone coffer in which relics of the body of Buddha were enshrined by his tribesmen, the Sākyas[1]. The bricks are huge slabs set in mud mortar, of which the largest measure 16 × 11 × 3 inches. Such a structure is obviously a development of the earthen tumulus, kiln-baked brick slabs being substituted for earth in order to ensure permanency.

It is very evident that the British have wrongly dated the Indian stone monuments purposely to reduce chronology. In their overenthusiastic attempts, the putting everything after 'Asoka' has been clear. Thus, the dating of 'Asoka' has been crucial one in Indian history, as the script is linked with and so also Indian 'history'.

The Sheet Anchor of Indian History and Chronology: The Max Mueller's 'sheet anchor' date of 327-326 BCE had been consistently working in the minds of every European writer. Jas Burgess wrote:

> We possess scarcely a landmark in history previous to the invasion of India by Alexander the Great in the fourth century BC, nor do we know of an architectural monument earlier date.[80]

Vincent Arthur Smith recognizes and places the so-called 'the earliest Indian building' around 450 BCE in round figures, for which, he has 'very good reasons':

> The earliest Indian building to which an approximate date can be assigned is the stupa at Piprahwa on the Nepalese frontier, explored by Mr. W.C. Peppe in 1898. Very strong reasons exist for assigning this building to 450 BC in round numbers, shortly after the decease of the Gautama Sakyamuni, commonly known as Buddha.[81]

Immediately, he explains exposing his psyche:

> Although the art of constructing substantial edifices of brick masonry was well understood in Northern India four or five centuries before Christ, and must have been introduced perhaps from Babylon, as a much earlier date, there is good reason of believing that the ornamental buildings of ancient India were mainly constructed of timber. Brick

> foundations and substructures were probably common; but the whole history of Indian architecture proves that the superstructures of the early buildings possessing architectural features must have been, as a rule, executed in wood, like the modern Burmese palaces. The Piprahwa is a monument of engineering rather than of architectural skill.[82]

Then, he deals with 'the history of India' as follows:

> It is possible that when the really ancient sites of India, such as Taxila and Vaisali, shall be explored, remains of buildings assignable to the fourth, fifth and sixth found, are likely to consist of stupas and the plinths or substructures of wooden superstructures which have long since disappeared. But, the results of exploration of these ancient sites, so far, have been disappointing; and in our state of ignorance a great gap, to which no material remains can be assigned, exists between the date of Piprahwa stupa and that of Asoka Maurya, two centuries and half later. In fact, the history of Indian art may be said to begin in the reign of Asoka (272-231 BCE) and all the known remains assignable to the period are probably later than 260 BC.[83]

His anxiety that, "remains of buildings assignable to the fourth, fifth and sixth found, are likely to consist of stupas and the plinths or substructures of wooden superstructures which have long since disappeared" proves the contradiction. When 150-180 years, could not be reconciled, why they should have indulged in playing with the 1400 years of gap (between IVC and Mauryans)? The assertion that, "in our state of ignorance a great gap, to which no material remains can be assigned", also proves the dilemma in meddling with chronology. It is not that material evidences are not available, but the dating of material evidence with the assumed history only poses problems of contradictions of 'gaps'. If they decided already that, " In fact, the history of Indian art may be said to begin in the reign of Asoka (272-231 BCE) and all the known remains assignable to the period are probably later than 260 BC", then, there is no meaning in conducting any historical research. Here, the lacuna, discrepancy and incongruity of the Indologists has been very visible, as could be noted easily, as they themselves had been in such awkward condition. The dating of Asoka has been thus, artificial, as the dating of monuments expose such exigency. The complete bias against India, supporting for Greeks has also been superficial, as they always recorded that India derived everything from the Greeks, if not from the Persians, Assyrians, Babylonians or Chinese. As now, there have been pre-Mauryan evidences, as pointed out, they have to be taken into consideration.

In fact, the place has other monuments also, as depicted below, but they are not discussed.

The Barabar caves are some 35 km north of Gaya, in the state of Bihar.

The whale-backed quartzite gneiss hill stands in wild and rugged country and the inscriptions reveal that, on instructions from Asoka (264-225 BC), four chambers were excavated, cut and chiselled to a high polish by the stone masons, as retreats for ascetics who belonged to a sect related to Jainism. That polish still remains, 2,300 years later. Percy Brown pointed out that the extraordinary caves, particularly the Lomas Rishi and the Sudama, are exact copies of ordinary beehive huts built with bamboo, wood, and thatch. The barrel-vaulted chamber inside the Sudama is 10 m long, 6 m wide, and 3.5 m high which through a doorway leads to a circular cell of 6 m in diameter. The most impressive craftsmanship is seen on the facade of the Lomas Rishi which replicates the horseshoe-shaped gable end of a wooden structure with two lunettes which have very fine carvings of lattice-work and rows of elephants paying homage to Buddhist *stupas*. Excavation is incomplete as there was a possibility of the cave collapsing. There is also a Shiva temple on the nearby Siddheshwar peak.

The note that the Buddhist Asoka ordered the cave to be built for the Jains makes clear that this Asoka is different from the Asoka of Mauryas.

The availability of *Shivalings*, Ganesh Idol and other broken sculptures are intriguing. It can be argued that Asoka had been so egalitarian that he ordered for cutting caves for Jains and perhaps for Hindus also naming them as Lomas Rishi, Sudhama and so on. But, he had been a staunch converted Buddhist and there had been another Asoka, as recorded by Kalhana, who was a Jain. Kalhana records that that Asoka constructed many *stupas/viharas* for Jains. Again, scholars opined that the so-called Asokan inscriptions did not belong to one Asoka, but two. However, Vincent Smith impressed upon and clubbed all into one.

Note the broken condition of Ganesh Idol and another broken sculpture left with legs and thus, the entire body was broken and taken away.

The above photo shows a *Shiva-linga* carved in the rock boulder available there itself. However, the Indologists neither mentioned them in their records nor discussed about them.

Asoka, Buddha and connected issues and the Piprahwa forgery: As the dating of Lomas-Rishi cave, Buddha, Asoka and his inscriptions play crucial role in Indian chronology, some events taken place around such dating methodology has to be studied here in the context. Alois Anton Fuhrer, an ASI official Assistant Editor of *Epigraphica Indica* working in the NE frontier was brought to Uttar Pradesh. In January 1898, the William

Claxton Peppe a British landowner excavated a large brick mound on his property to discover a huge stone coffer containing four soapstone urns filled with ashes and bone, along with hundreds of gems, gold stars and other objects. W.C. Peppe informed A.A. Fuhrer about his discovery. Fuhrer took the Urns and the jewels possessed by W.C. Peppe. Later, Asokan inscriptions were found on the Urns. Later either, he himself engraved it or made it through somebody as per his directions. He was also dealing with spurious Buddhist relics and selling to the Buddhist monks having contacts with U. Ma, Buddhist monk.

A.A. Fuhrer in 1896, he discovered Lumbini, the birth place of Buddha with Asokan inscriptions on pillar in the Nepalese Terai and the discovery was reported in December 1896. He sent the details with impressions of the inscriptions to Buhler. Buhler[84] in February 1897 published it in the *JRAS* (GB & I) under the caption 'The Discovery of Buddha's Birthplace'. However, he recorded his doubts as follows:

> While Hiuen Tsiang says that the pillar at Lumbini garden was broken into two pieces, Fuhrer says the ruins were intact.
>
> Hiuen Tsiang does not mention any inscription, whereas Fuhrer claims a Asokan inscription on it.
>
> Fuhrer reports that the Asokan inscription was found 10 feet below the ground. When he saw the pillar on December 1, 1896, he could note a pilgrim's record made in AD 800. So Buhler doubts that it is impossible to believe that 10 feet of debris could have accumulated in the 64 years between the Hiuen Tiasang's visit and the incision of the oldest pilgrim's record at the top Pillar.
>
> He also hopes the mutilated lines of Nigliva inscription might be restored.

Johan Georg Buhler (1837-1898), connived with Fuhrer: J.G. Buhler contributed many articles in research journals and particularly *Epigraphica Indica*. Therefore, taking cognizance of his observation, the British scholars started probing the activities of Fuhrer. An enquiry Committee formed found out that Fuhrer copied text from a report prepared by Georg Buhler on Sanchi inscriptions, transposed both texts and inscriptions, almost verbatim, into the report on his own excavations carried out at a completely different site. Knowing the plagiarism, Buhler warned him. There had been correspondence between the two in this regard.

Edward J. Thomas[85] provides more details:

> "Dr. Fuhrer, who found the pillar (Nigali Sagar tank, near Nigliva village, Basti District, Nepal), claimed to have discovered the great *stupa* itself

> close by and gave an elaborate description of it. But unfortunately for himself he next discovered the still more important Padaria pillar, and the further investigation of this led to the revelation of the fictions in his account.[86]

It is only necessary to quote V.A. Smith's statement that, 'every word is false' and the inscriptions that produced by Fuhrer were 'impudent forgeris'. Smith came to the conclusion that "the pillar had been moved about eight or thirteen miles from its original position either at Sisania or Palta devi."[87] However, the forged inscriptions are appearing majestically in Corpus Inscriptionum Indicarum – Inscriptions of Asoka, published in 1922 by E. Hultzsch as 'Asokan inscriptions', without making any whisper about the forgeries.

Mysterious Disappearance or Suicide of Georg Buhler: In a recent Conference held at Harehouse, Yorkshire under the auspices of the Royal Asiatic Society on July 8, 2006, Andrew Huxley argued about the mysterious disappearance and probable suicide of the great Indologist, Georg Buhler, as he was involved in the activities of Fuhrer and his unwitting implication in his forgery of Piprahwa Urn Inscription.[88] According to another version, he was reportedly drowned in an accident falling from a boat. In fact, the year of disappearance is 1898, the year in which the forged inscription on Urn found, Fuhrer discovered and dismissed from his service for the forgery. It is really surprising that a scholar like Buhler would simply vanish in the air, that too, in the same year in which his colleague was punished for his forgery.

Withdrawal of Fuhrer's Monograph but not the forged Asokan inscriptions: After the Vincent Smith's declaration of forgeries of inscriptions by Fuhrer, his discoveries publicized in his *Monograph on Buddha Sakyamuni's birth-place in the Nepali's Tarai* at Allahabad in 1897. However, the Nigali inscriptions are appearing in the official in *Corpus Inscriptionum Indicarum – Inscriptions of Asoka,*[89] *Epigraphica Indica* and widely discussed and made 'history of India'.

The collusion of British rulers, officials and historians: The Pirahwa cave buildings or Barabar caves created a sensation among the British rulers and scholars. They contain the following:

1. Lomas Rishi cave with the sculptured doorway of a row of elephants, on which a ventilator type carvings, etc. A sunshade is there above supported with lintels. The semi-circular three-stripped sun-shade has a Kumbha on it at the centre.
2. Karna Chaupar has an inscription reportedly that of Asoka. The second is Sudama or Nyagrodha cave of dimensions 10 x 6 x 3.5 m implying

a very big hall with doorway leading to a circular cell of 6 m diameter. It has an Asokan inscription.

3. Shiva temple on the nearby Siddheswar peak. Broken Ganesha stature and other sculptures are found on the top of Siddheswar peak. A *Shiva-linga* carved in boulder is also found.
4. Three rock-cut sanctuaries at Nagarjuna hill just one km north-east of Barabar containing inscriptions of Dasaratha. They called as Gopika-Milk-mad, Vhiyaka and Vadadhika caves.

Percy Brown mentions about Lomas Rishi and Sudama caves. Fergusson details all. But, they did not mention about the broken sculptures and *linga*. As the interior walls were chiselled nicely and polished, the purpose of usage was debated differently. Vincent Smith (1848-1920) gave a round figure of c. 450 BCE for goods reasons to the earliest Indian building.

Thus, his only anxiety is that no date should go beyond c. 500 BCE, that too Indian art should not go beyond Asoka, as otherwise, the gap between Piprahwa *stupa* and Asoka could not be explained. Interestingly, Edward J. Thomas[90] was also worried about this gap of 250 years.

> Another misconception was to assume that if the inscription is not a forgery, it must be contemporary with the death of Buddha...In fact the only reason for putting it two centuries earlier was the hope of identifying with the share of the relics received by the Sakyas.

So he wanted the dating should go with the findings of Fuhrer, particularly with the comfortable reading of the Asokan inscription written on the casket, than anything else, in spite of the fact that the inscription itself is forged or not. Evidently annoyed by the forgery problem, he busted out through Oldenberg:

> 'When Asoka himself appears as witness,' says Oldenberg, 'will anyone doubt that here (Piprahwa) in truth and reality lay the realm of the Sakyas?' Asoka's inscription is only the testimony that he believed what he went to see, the site of an event that had happened two centuries before, and he believed equally in Konagamana.

Compare this with Rhys Davids':

> And we are fairly entitled to ask: 'If this stupa and these remains are not what they purport to be, then, what are they?'

Tussle between Thomas Watters and Vincent Smitht on the location of Lumbini: According to Vincent A. Smith, "Mr. Watters writes in a specific skeptical spirit, and apparently feels doubts as to the reality of the Sakya principality in the Tarai". The editors of Watters' book (On Yuan Chwang's

Travels in India 629-645 AD), T.W. Rhys Davids, S.W. Bushell and Smith had suppressed the Watters' manuscript. Doubting Rhy Davids, Watters had published his writings in *The China Review*, Vols. 18-20, 1890-92. Fearing controversy, the editors unwittingly mentioned in the preface to the book, "We have thought it best to leave Mr Watters's Ms. Untouched, and to print the work as it stands". This clearly shows that the editors have edited the text much against the wishes of Watters.

Thus, it is evident that they wanted to exonerate Fuhrer and his Company to safe their skin, as otherwise, it would expose more of their manipulations. Here, the main point to be noted is that they did not want to date any monument of India before Asoka and this attitude itself is culpable leading to other frauds.

The manipulations of Dr. Alois Anton Fuhrer,[91] **Assistant Editor of Epigraphica Indica**: About A.A. Fuhrer's activities, T.A. Pelps notes:

> In his official Progress Report as Archaeological Surveyor in that year, Fuhrer copied large slabs of text from a report by Buhler on Sanchi inscriptions, transposing both texts and inscriptions, almost verbatim, into the report on his own excavations at a completely different site. Astonishingly, this wholesale and extensive plagiarism appears to have passed completely unnoticed during this period (including, apparently, by Buhler himself, with whom Fuhrer was soon afterwards in correspondence). He also - and more ominously, perhaps, in the light of later events – fraudulently incised a Brahmin inscription on to a stone statue in the Lucknow Museum at this time, an event which also unnoticed.

The other disturbing details are:

Fuhrer had been conducting a steady trade in bogus relics of Buddha with a Burmese monk, U Ma.

Among these phoney items – and a year prior to the Piprahwa finds – Fuhrer had sent U Ma a soapstone relic-casket, supposedly containing Buddha-relics of the Sakyas of Kapilavastu, together with bogus Asokan inscriptions, these deceptions thus duplicating, at an earlier date, every important detail of the supposed Piprahwa finds.[92]

He was also found to have falsely laid claim to the discovery of 17 inscribed 'Sakya heroes' which were alleged inscribed upon these caskets.[93]

Peppe[94] noted that the so-called 2500 years old bone relics "might have been picked up few days ago'. A molar tooth found among these items (retained by Peppe) has recently found to be that of a pig.[95]

When Peppe returned to London, the London Buddhist Society wanted to clarify about his findings. Though, he agreed, he did not answer

> the questions proposed. The Society declared the matter to be kept in abeyance in consequence; but Peppe died six years latter, leaving all such questions unanswered.[96]

Realizing the gravity of the situation, the Government appointed an enquiry committee and it was found that Fruhrer made the Asokan inscriptions written on the casket that contained the Buddhist relics planted. Therefore, Dr. Alois Anton Fuhrer, Editor of *Epigraphica Indica* was dismissed from the service in 1898 for his forgery of creating Buddhist Urns and inscription on them. The Secretary to the Lieutenant-Governor of the North-Western Provinces in his letter to the Central Government noted:

> His Honour fears that it must be admitted that no statement made by Dr. Fuhrer on archaeological subjects, at all events, can be accepted until independently verified

But, everything has been accepted as history and historians and history reading Indians do not know that such forgery and dismissal of Fuhrer and disappearance/suicide of Buhler are there behind such Indian history.

Conclusion: Analysing the material evidences, particularly, the stone monuments, it is evident that the Indologists have wrongly dated the stone monuments, which are now proved based on the stratigraphical studies in correlating and corroborating with the historical events.

The pre-Buddhist Jaina monuments have been totally ignored, as if they were not available, but the Jaina sculptures clearly point to wrong dating of stone sculptures. Edward Thomas[97] pointed out that the Indologists knew the Jaina Asoka and in fact, there was confusion that they were thinking Mahavira and Buddha were one and the same. To deny the antiquity of Jaina faith, the Western scholars confused that Buddhism could have emanated from Jainism or both Janism and Buddhism were one and the same and so on. Colebrooke[98] was virtually convinced that Buddhism was an emanation from anterior Janism, summarising his conclusions to the following effect:

> It is certainly probable, as remarked by Dr. Hamilton and Major Delamaine that Gautama of the Jains and of the Bauddhas is the same personage; and this leads to further surmise, that both sects are branches of one stock. According to the Jainas, only one of Mahavira's eleven disciples left spiritual successors; that is the entire succession of Jaina priests is derived from one individual, Sudharma-swami. Two only out of eleven survived Mahavira, viz., Indrabhuti and Sudharma: the first, identical with Gautama-swami, has no spiritual successors in the Jaina sect. The proper inference seems to be, that the followers of this surviving disciples are not of the sect of Jina, rather than that there have been none...

> I take Parswanatha[99] to have been the founder of the sect of Jainas, which was confirmed and thoroughly established by Mahavira and his disciple Sudharma... A schism, however, seems to have taken place, after Mahavira, whose elder disciple, Indrabhuti, also named Gautama-swami, was by some of his followers raised to the rank of a deified saint, under the synonymous designation of Buddha (for Jina and Buddha bear the same meaning, according to both Buddhists and Jainas).

That the date of Parsvanatha, the 23rd Tirthankara given as c. 872-772 BCE shows that there is something wrong with the dating of Asokan inscriptions, because, this makes everything before Asokan prehistoric, i.e., non-historic. The dating of monuments neat to Asokan inscription to pre-Mauryan period clearly shows that Asokan inscriptions have been dated to a reduced chronology. Asoka of Kashmir, who was a Jain, was completely ignored. The Piprahwa forgeries and manipulations clearly expose the unhistorical activities of the British and other involved European Indologists (as discussed above).

The recent dating of archaeological evidences – the domesticated rice on the banks of Ganges to c. 6500-6000 BCE and the usage of iron to c.1800 BCE prove the antiquity of Ganges Valley civilization. The mounting pre-Mauryan evidences as discussed above point to the fact, that there was not vacuum before Asoka, but there was history that was ignored by the Indologists. As such evidences are found on the banks of Ganges River, the GVC could be considered as an active and continuing civilization.

As every subject is updated with the recent findings, the Indian history should also be updated with the recent findings and the wrong conclusions made earlier by the Colonial and other motivated hypotheses and theories should be discarded. Spending crores of Rupees, getting new evidences, presenting papers, publishing books, but keeping the history curriculum to the stagnant, outdated and unscientific status does not help the growth of subject. In filling the historical gap between IVC and Mauryan period, the GVC would play a crucial role as discussed above.

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17

Indus-Sarasvati Civilization: In Search of the Truth

Bhu Dev Sharma

ABSTRACT

There is need to strengthen the researches and discussion on Indus Valley Civilization. The controversial theory of 'Aryan Invasion Theory' needs to be analyzed in the light of what is advanced under 'Out of India Theory' (OIT).

The paper, after setting the problem and issues, takes up for discussion and refutation the three main points that proponents of AIT consider crucial for their stand. Then pointing out two major weaknesses in AIT, the paper presents several points that support that the 'Indus-Sarasvati Civilization' has been an indigenous Indian/Vedic civilization.

INTRODUCTION

Indus-Sarasvati Civilization mostly referred as 'Indus Valley Civilization' (IVC) is one of the major and active areas of research on world civilizations and history. Understanding the large number of seals, deciphering the script having over 400 characters, dating the large number of varied artefacts found spread over vast area lying in Afghanistan, India and Pakistan to greater accuracy present a great challenge. Though about India glorious past, in my opinion, academically speaking it is a subject of finding truth about world heritage.

With prolonged invasions, hostile occupations, religious torments, and later British colonization, Indian history has been the handiwork of motivated historians. At the hands of such historians, history became the

worst victim, full of many incongruencies. With its many old records destroyed and lost, what survived were those that could be taken as religious books, myths and stories. But these have facts of history – social history – hidden in them. A literature, after all, is mirror of its society. After independence 'wounded India' got its Ancient and Medieval history written by a class of historians, trained by British school of thought, largely deficient in Sanskrit, the language in which India spoke through its pristine ages of freedom. Ideologies colour perceptions. India lost initial zeal to know itself and is perhaps still groping in some darkness.

Original research in the area needs several kinds of expertise, namely, archaeology, history, linguistics, Vedic studies, etc. I got involved in the debate on IVC and got fascinated by its importance around 1990s. I had occasions of reading/listening to various expert opinions. It was in 1996, that by dint of good fortune, I became the organizer of the first conference ever held in USA on this topic. This was an international conference held in Atlanta, USA with the main theme, '*Revisiting Indus-Sarasvati Age and Ancient India*'. However, I am no expert in the field. The subject continued to attract scholars in subsequent International conferences organized by me under the auspicies of WAVES in Los Angeles (CA-1998), Hoboken (NJ-2000), Dartmouth (Mass-2002), and Washington (DC-2004). I also ended up editing proceedings of the first three of these conferences, which contain papers of a number of prominent scholars, including B.B. Lal, Jim Shaffer, Subhash Kak, Koenraad Elst, Hans Henrich Hock, Edwin Bryant, Shiva Bajpayi, S. Kalyanaraman, to name a few.

After setting the problem for discussion, the paper takes up for discussion and refutation the three main points that proponents of AIT consider crucial for their stand. Then pointing out two major weaknesses in AIT, the paper presents several points that support that Indus-Sarasvati Civilization has been an indigenous Indian/Vedic civilization.

IVC IS AIT OR OIT? THE BACKGROUND

Though the ruins at the Harrappa site were identified by British engineers in 1842, and Alexander Cunningham published the first Harappan Seal in 1872-75, the best known archaeological sites of the Indus-Sarasvati civilization are Mohenjo-daro and Harrappa. Excavation work at Mohenjo-daro was done from 1922 to 1931 and 1935 to 1936. Excavation at Harrappa took place from 1920 to 1921 and 1933 to 1934.

The Aryan Invasion Theory (AIT) was put forth then stating that there existed a highly developed civilization that was destroyed by invading Aryans who entered India from 2600 to 1900 BC, occupied the vast land,

pushing the original inhabitants, Dravids, to south of India. The words 'Arya' and 'Dravid', were picked up from Indian sources, totally out of context.

Over 2500 other sites of this civilization have been discovered later in the wider region, after the theory of AIT was put forth. Satellite pictures of the region are also available. AIT has been challenged by a whole group of scholars based on researches, evidence and facts that appeared later. The alternate theory in short is sometimes referred as 'Out of India Theory' (OIT), that formulates that IVC was indigenously Indian/Vedic and from here it expanded to some other parts of the world.

The current position is that the AIT persists (even at the official level in India), while the its challenge by OIT is rather formidable.

The idea of the Aryan invasion, according to those who challenge it, was not merely a matter of misguided research, but was a conspiracy formulated on April 10, 1866 in London at a secret meeting held in the Royal Asiatic Society. The theory of the Aryan invasion of India was cooked-up there so that Indians could accept British rule just as they accepted earlier rulers all along from outside. That this was a political move is also supported from the fact that it was enthusiastically included in syllabi of all schools and colleges.

In line of the above argument, AIT had threefold colonial purposes. To make it appear that Indian culture and philosophy was not indigenous but that which originated in Europe; to justify colonial rule and to prepare a basis for Christian expansion in India. This, by the way, was also the purpose of the study of Sanskrit, such as at Oxford University in England, as indicated by Colonel Boden who sponsored the programme. He stated that they should "promote Sanskrit learning among the English, so as 'to enable his countrymen to proceed in the conversion of the natives of India to the Christian religion'. A new discipline, 'Indology', was concocted, whose experts and authorities could be Europeans of colonial design.

Not being a fact, through the theory the British succeeded in sowing the seeds of racial division in Indian society. It may be mentioned that applying racial notions in the society has been a European construct. It also continues officially even today, while the idea of racial division is not to be found in Indian thoughts and practices. Incidentally, this race idea continues to be exploited by the politicians and Christian converts in India for their gains.

ON GOING WORK

Today world scholars from Europe, USA, Japan and other places are engaged in bringing out the truth of Indus-Sarasvati Civilization, that is buried for

nearly 7000 years. Indian and Pakistani scholars joined this fray mostly after independence. It may be pointed out here that dating Vedas has presented formidable difficulties to the westerners. Max Muller, the well known Indologist and translator of Eastern texts, who never wrote anything in Sanskrit, was also a great proponent of speculating on the dates of the compilations of the Vedas. He had originally estimated that the *Rig-Veda* had been written around 1000 BC. However, when he could not defend himself in arriving at that date, he later wrote in his book, *Physical Religion* (p. 91, 1891), "Whether the Vedic hymns were composed 1000, 1500 or 2000 BCE, no power on earth will ever determine." The fact is that the colonial scholars of the time believed in the Christian chronology, that the world was created at 9: 00 a.m. on October 23, 4004 BC and the great flood occurred in 2500 BC. Thus, accepting the Christian time frame, all dates were speculative on a wrong scale

There are a variety of opinions and number of open areas for research on Indus-Sarasvati Civilization. The traditional view of Aryan invasion put forth has been seriously challenged. Edwin Bryant and Laurie Patton have edited a collection of papers, *The Indo-Aryan Controversy: Evidence and Inference in Indian History*. Both the editors are personally known to me. They put together divergent viewpoints, ranging from total confirmation of the Aryan Invasion Theory (AIT) and its total rejection in favour of 'Out of India Theory (OIT)'. There are a number of other publications by B.B. Lal, S. Kalyanaraman, Koenraad Elst and others.

THREE MAIN POINTS OF AIT/AMT PROPONENTS

Three main points on which proponents of AIT/AMT continue to hold ground are (Refer – UCLA Professor Vinay Lal: Indus Valley Civilization, http://www.sscnet.ucla.edu/southasia/History/Ancient/Indus2.html):

> The Indus Valley people do not appear to have been in possession of the horse: there is no osteological evidence of horse remains in the Indian sub-continent before 2,000 BCE, when the Aryans first came to India, and on Harrappan seals and terracotta figures, horses do not appear.
>
> Neither Harappa nor Mohenjo-daro show any evidence of fire altars, and consequently one can reasonably conjecture that the various rituals around the fire which are so critical in Hinduism were introduced later by the Aryans.
>
> In most respects, the Indus Valley Civilization appears to have been urban, defying both the predominant idea of India as an eternally and essentially agricultural civilization, as well as the notion that the

> change from 'rural' to 'urban' represents something of a logical progression. The Indus Valley people had a merchant class that, evidence suggests, engaged in extensive trading.

One can see that these are just conjectures, not so critical for the theory either way. These can be disputed logically and can be dismissed to a good extent, as is outlined below:

B.B. Lal (1998) mentions finds of true horse in Surkotada, Rupnagar, Klibagan, Lothal, Mohenjo-daro and terracotta images of the horse from Mohenjo-daro and Naushero. Many bones of the related half-ass have also been found, and one should not discount the possibility that in some contexts, the term *ashva* could refer to either species. Koenraad Elst has argued that absence of horse, even if taken to be true

> is not absolutely damaging ... as reputedly Aryan sites are likewise poor in horses. ... it also is the case for Hastinapura, a city dated by archaeologists at ca. 8th century BC, when part of the India was definitely Aryan. ... So, the argument from near-silence regarding horse bones need not prove absence of Aryans, nor fatal to OIT.

Further Swami B.V. Giri, in his well written article tells that

> Excavations by Dr. S.R. Rao have discovered the remains of a horse from both the Late Harrapan Period and the Early Harrapan Period (dated before the supposed Invasion by the Aryans), and a clay model of a horse in Mohenjo-daro. Since Dr. Rao's discoveries other archaeologists have uncovered numerous horse bones of both domesticated and combat types.

Talking of fire-alter – *yajna-vedis*, according to Swami B.V. Giri, "the remains of *yajna-vedhis* (fire altars) were uncovered in Harrapa by B.B. Lal of the Archaeological Survey of India, in his excavations at the third millennium site of Kalibangan."

It seems, Professor Vinay Lal is unaware of the facts brought out in of some post-1980 studies. For example **Jarrige, J.-F. (1986): "Excavations at Mehrgarh-Nausharo" (Pakistan Archaeology 10(22): 63-131)** indicates that food production was largely indigenous to the Indus Valley. It is known that the people of Mehrgarh used domesticated wheat and barley, and the major cultivated cereal crop was naked six-row barley, a crop derived from two-row barley (see Shaffer and Liechtenstein, 1995, 1999). Archaeologist Jim G. Shaffer (1999: 245) writes that the Mehrgarh site "demonstrates that food production was an indigenous South Asian phenomenon" and that the data support interpretation of "the prehistoric urbanization and complex

social organization in South Asia as based on indigenous, but not isolated, cultural developments."

Quoting from Wikipedia, we can say,

> Indus civilization agriculture must have been highly productive; after all, it was capable of generating surpluses sufficient to support tens of thousands of urban residents who were not primarily engaged in agriculture. It relied on the considerable technological achievements of the pre-Harappan culture, including the plough. Still, very little is known about the farmers who supported the cities or their agricultural methods. Some of them undoubtedly made use of the fertile alluvial soil left by rivers after the flood season, but this simple method of agriculture is not thought to be productive enough to support cities. There is no evidence of irrigation, but such evidence could have been obliterated by repeated, catastrophic floods.

It can, therefore, be easily seen that AIT or AMT are sufficiently contradicted and weakened on these three points.

MAIN WEAKNESS OF AIT/AMT

Two strong points that counter the AIT or 'Aryan Migration Theory'(AMT) are:

1. The failure to point out the original homeland of Aryans, from where they are billed to have come to Indus Civilization areas. The proposed sites are suggested throughout the Indo-European world many thousands of miles apart.
2. The date of migration/invasion, that varies by centuries and in some cases by millennia.

POINTS IN SUPPORT BY IVS BEING INDIGENOUS INDIAN/VEDIC

(a) Name Brahminabad: In 1856, British engineers John and William Brunton were supervising the East Indian Railway Company line connecting Karachi and Lahore. John wrote "I was much exercised in my mind how we were to get ballast for the line of the railway." They were told of an ancient ruined city near the lines, called 'Brahminabad'. The place had the traditional name 'Brahminabad'. Does a non-Vedic tradition has Brahmins? (Refer Robert Davreau 1976. 'Indus Valley', in *Reader's Digest: World's Last Mysteries).* This local traditional evidence supports that IVS was a Vedic Civilization.

(b) Cultural Continuity: Many crafts "such as shell working, ceramics, and agate and glazed steatite bead making" were used in the making of necklaces, bangles, and other ornaments from all phases of

Harappan sites and some of these crafts are still practiced in the subcontinent today (Jonathan Kenoyer, Mark 1997. 'Trade and Technology of the Indus Valley: New Insights from Harappa, Pakistan'. *World Archaeology* **29** (2: "High-Definition Archaeology: Threads Through the Past"): 262–280.) Some make-up and toiletry items (a special kind of combs (*kakai*), the use of collyrium and a special three-in-one toiletry gadget) that were found in Harappan contexts still have similar counterparts in modern India. Terracotta female figurines were found (ca. 2800-2600 BCE) which had red colour applied to the 'manga' (line of partition of the hair), a tradition which is still seen in India.

(c) Their Domesticated animals: They domesticated animals like cattle, bears, wild pigs, dogs, water buffalo, elephants, monkeys, dromedary, chickens, goats, cats, and sheep.

(d) Some significant Indus tablets: There are seals that have Vedic signs and motifs in particular *Swastika*, and the Bull.

(e) Touchstone: A touchstone bearing gold streaks has been found in Banawali, which must have been used for testing the purity of gold. This technique is still used in most parts of India.

(f) Social: If IVS was a Dravidian Civilization and Aryans by invasion or migration pushed it to south, The Dravidians after moving to other parts must have created the same kind of civilization in their new settlement areas. But there is no trace of a similar civilization found.

CONCLUSION

Sarasvati is a major river mentioned at least sixty times in Vedas. It is now a dry river, but it once flowed all the way from the Himalayas to the ocean across the desert of Rajasthan. The latest satellite data combined with field archaeological studies have shown that the Rig Vedic Sarasvati had stopped being a perennial river long before 3000 BC.

Kenneth Kennedy of Cornell University has recently proved that there was no significant influx of people into India during 4500 to 800 BC.

While the debate takes its time to die down with some diehards of AIT, OIT sincere researchers have a bigger task chalked out for them. This, from my point of view, is to find more about science and mathematics of IVC, without which such a great civilization just could not have existed on the earth.

Satyam-eva Jayate (Truth alone prevails)

18

Sarasvati and Her Vedic Symbolism

Sampada Savardekar

INTRODUCTION

The most unfortunate thing, in the educational scenario, next only to the lack of education, is the fact that, the knowledge of Indian history present in the history books today is far from true. The upcoming younger generation is not well informed or rather, misinformed about their culture and heritage; and thus they can hardly be expected to grow into proud Indians. We are what our culture makes of us, and we are necessarily the result of the culture and heritage and its influence that flows in our genes. The only outer impact or influence that can change and alter our feelings and understanding is the influence of our education, and most significantly: early education. The tragedy is that most people, intellectuals and educationists, are probably either not aware of the damage being caused by incorrect and inappropriate textbooks on formative minds; or they are conveniently ignoring the fact for a range of reasons. The latter is more likely to be true.

There are two sections in this paper:

Part 1 - We shall look briefly into what was the reason behind the invention of the so-called invasion theory.

Part 2 - In the second, however, I would like to concentrate not so much on the historical, scientific and archaeological data which tears the invasion theory into bits; but rather glance at another interesting yet significant aspect of this whole matter: the Sarasvati River herself, and her Vedic symbolism.

1. THE EARLY VISITORS

We note with pride that the early travellers to India spoke very highly of India, her culture and her people. There are several records of their words showering praises on India. I would like to quote a few:

> All Indians are free, and none of them is a slave. ...Indians neither invade other peoples, nor do other peoples invade India.... They fare happily, because of their simplicity and their frugality. ...Since they esteem beauty, they practise everything that can beautify their appearance. Further, they respect alike virtue and truth....[1]

Others like Mountstuart Elphinstone, the first Governor of the Bombay presidency in 1841, wrote in *History of India*:

> No set of people among the Hindus are so depraved as the dregs of our great towns.... The Hindus are mild and gentle people....

THE REAL 'INVADERS'

The real invaders were, in fact, the British who came to plunder and colonise India. From the very beginning, the connection between India and Britain was based on greed and oppression. They were not interested in her heritage and culture; but did not fail to notice it. Their greed knew no bounds upon discovering the incredible wealth of India; and a plan was created to rob her of her riches.

They were quite aware that it was not easy to conquer India and her peoples, without creating a division among its peoples. For, as long as India stood as one solid rock, one undivided entity to defend herself; it would not be possible for any alien power to penetrate her. Lord Macaulay quickly saw, where the attack was needed, and he suggested that English education be implemented in India to help them dominate her.

And this they did successfully. They devised a plan to rob her of her own self-esteem by penetrating deep into her system of Education, corrupting it by the incorrect and baseless assumption of the so-called Aryan Invasion. Unfortunately, this trick worked remarkably in their favour, as in a matter of a few years, many intellectuals, and educationists also began to accept this. The British argument was simple:

> You Indians have been dominated by an alien (Aryan) culture for so many centuries. We are just another wave of ruling aliens, and in fact, have come for your upliftment. If you could absorb the Aryans, who were themselves barbaric; then why not us, who are so much more sophisticated and cultured than yourselves?

An alarming example of this logic can be seen in the speech by Stanley Baldwin, in British House of Commons in 1929.

> Ages and ages ago there sat, side by side, the ancestors of the English, Rajputs and Brahmins. Now, after ages, the two branches to the great

> Aryan ancestry have again been brought together by Providence.... By establishing British rule in India, God said to the British, 'I have again brought you and the Indians together after a long separation, not in order that you should lord over them, or that you should exploit them, but in order that you should recognize your kinship with them.... It is your duty to raise them to their own level as quickly as possible, and work together, brothers as you are, for the evolution of humanity....[2]

A very convenient way indeed of terming colonisation as God's will!

ARYA/DRAVIDA CONFLICT

'Arya' and 'Dravida' were initially words, which never had any racial connotation. Arya purely meant one of moral and inner quality. Dravida came on the purely geographical basis. It had no connection in the Veda with race. The invasion theory, basically, was successful in creating a gap, a misunderstanding between the north and south Indians, who considered themselves Dravidians and thought they were being polluted by the barbaric Aryans. Even today, we hear that the Dravidians (South Indians) being told to resist the domination of the so-called Indo-Aryans or (North Indians), who wish to pervert their culture. This is the result either of the scheming minds of politicians, or of the incorrect but effective history lessons that they have been taught since childhood.

Many hymns were very conveniently accorded a racial twist by some recent scholars. They alluded to certain hymns, which described wars between the Arya and the Dasyus (dark aborigines) and here it was also noted that the Aryas were continuously storming their cities. But Sri Aurobindo clearly states that these conflicts were nothing but battles between the forces of light and darkness.

> These Vritras, Panis, Atris, Rakshasas, ...are not Dravidian kings and gods, as the modern mind with its exaggerated historic sense would like them to be; they represent a more antique idea better suited to the religious and ethical preoccupations of our forefathers. They represent the struggle between the powers of the higher Good and the lower desire, ...[3]

In recent days, a Canadian archaeologist, George Erdosy, repeats what Sri Aurobindo had said decades earlier.

> Even apparently clear indication of historical struggles between dark aborigines and Arya conquerors turn out to be misleading.... It is a cosmic struggle which is described in detailed (Vedic) accounts that are consistent with one another.[4]

WHO IS THE JUDGE?

We have seen the opinions of some of the Western scholars, and their claim upon the Aryan Invasion theory as true. But I ask each and every Indian: Who is more fit to judge the history of India, her people, and her culture? Those who wished to loot and plunder her, or those great and illumined minds who guided her towards her destiny?

On the one hand, we are faced with people like Mr. Richard temple, Stanley Baldwin, and Lord Macaulay who would have us believe that India needed to civilize herself with their guidance; on the other hand we have great thinkers and philosophers like Swami Vivekananda, Swami Dayananda Sarasvati and Sri Aurobindo. Here are some of their inspiring and potent words:

Swami Vivekananda, in a lecture in USA:

> And what your European Pandits say about the Aryans swooping down from some foreign land snatching away the land of aborigines and settling in India by exterminating them, is all pure nonsense, foolish talk. Strange that our Indian scholars too say 'Amen' to them. And all these monstrous lies are being taught to our boys![5]

A systematic refutation of the Aryan invasion was forwarded by Sri Aurobindo after his close study of the Vedas in the early 1900s. He calls it 'a modern legend and not ancient history'.[6] He categorically refuted the fact that there was any significant proof in the Vedas to justify an Aryan invasion, and this he did several decades before the scientific defense was found. Along with this refutation, he also cast new light upon the interpretation of the Vedic verses. His study of the Veda proved to reaffirm the subtle, yogic experiences he had already had during the period of his intense *sadhana*. He says,

> In India we have fallen during the last few centuries into a fixed habit of unquestioning deference to authority.... We are ready to accept all European theories, the theory of an 'Aryan' colonisation of a Dravidian India, the theory of Nature-worship ... of the Vedic Rishis... as if these hazardous speculations were on a par in authority and certainty with the law of gravitation and the theory of evolution.[7]

Interestingly, we must also add that when Dr. Ambedkar who himself fought for equal rights of the lower caste and untouchables, approached the Vedas for an independent study, also agreed that the whole concept of the Aryans coming from outside of India and ruling over the present Dravidians, was false and baseless.

> The theory of invasion is an invention....The theory is based upon nothing but pleasing assumptions, and inferences based on such assumptions. The theory is a perversion of scientific investigation. It is not allowed to evolve out of facts. On the contrary, the theory is preconceived and facts are selected to prove it. It falls on the ground at every point.[8]

2. A NEW APPROACH

The entire basis of the repudiation of the invasion theory is the fact of the discovery of the dry bed of the Sarasvati River, which flowed thousands of years ago. The Satellite images and other scientific data, have contributed to the solid justification of the fact that the so-called invaders (Aryans), lived on the banks of this mighty Sarasvati and this is where a wonderful and many-faceted culture developed. Yet, I would like to propose that we look upon the mighty Sarasvati, with much more reverence than as a scientific location where a wonderful culture was born.

I would like to present before you, the symbolic connotation attributed to the river Sarasvati in the Vedas, in the light of the interpretation of the 20th century visionary: Sri Aurobindo.

When handling this subject of the symbolism, we are immediately faced with the question: "Do the Vedas have a symbolic or hidden meaning at all?" Now, this is a question that urgently needs to be answered in the affirmative. However, in order to assimilate this hidden meaning, and experience its truth, one must first realise that the poets of the Vedic times, the *ṛṣis*, had a completely different mentality than ours. An effort to understand their symbolism merely with a mental approach would be in vain. For, every field of activity has its own limitations, its laws, its 'dharma'. So also: science. If a scientist were trying to prove to us the existence of various planets in the Milky Way; he would definitely ask us to view the sky through the telescope. It is only through the help of that instrument that he can prove his point to us. But if I refuse to look into it, and insist that he should prove it to me in another manner visible to my naked eye, it is simply impossible. Even the scientist has to work within the *dharma* of his science.

In the *Gita*, when Arjuna wished to see the 'Visvarupa' of Sri Krishna, he humbly inquired whether it could be possible,

> "Manyase yadi tachhakyam mayā drastumiti prabho" [11.4];[9]

> To which Lord Krishna clearly says,

> "Na tu mām śakyase draṣṭumanenaiva svacakṣuṣā
> Divyam dadāmi te cakṣuh...."[10]

Just as the 'Divine Rūpa' could not be seen by the human eye, but only with the 'Divya Cakṣu'; so also, one cannot absorb or comprehend the subtle Truth behind the Vedic hymns without a psychological approach.

Who were these people who gave birth to our rich ancient heritage, who were they to whom we claim we owe our rich culture, tradition and spirituality? Could they really be nomadic tribes, or a semi-barbaric uncultured race, who could give birth to a culture as rich as the Vedic culture? Even a thought like this is prepostrous.

They were *ṛṣis*, *munis*, who had acquired great power and strength owing to their intense *tapasyā*. We refer to them as 'ṛṣayah mantradṛṣṭārah'. They were seers. They saw the Truth. Based on this 'seeing', the Indian philosophy is referred to as 'darśana', which in itself is significant. Owing to the power of askesis, they saw very plainly what an ordinary person could not have seen or experienced. But the most important thing was to maintain and safeguard the sanctity of the knowledge. It was for the purpose of maintaining this sanctity, that the knowledge was coded into a language, which could be understood only by one who was himself an 'adhikārī'. Therefore is it said, "...niṇyā vacānsi nivacanā kavaye...". This was a typical feature of the Vedic literature. The deeper truth of the words is revealed only to the seer, and for the rest, it appeared to be mere physical rituals. The sacred knowledge, once fallen into the hands of the wrong people could cause calamity and havoc, and even a regression for humanity, hence the precaution.

VEDIC SYMBOLISM

It is necessary to understand the Vedas for what they are, in their real meaning and depth, in their symbolic sense, and not as European scholars would have us understand them mentally. "What they (European scholars) sought for in the Veda was the early history of India, its society, institutions, customs, a civilisation a picture of the times."[11] This verily, was the error. The Vedas are a storehouse of knowledge and wisdom, they reflect the inner experiences of the *ṛṣis*, they are not meant to be the data collections describing material things and events. The right interpretation cannot be reached at with an incorrect approach.

It is indeed very hard to escape the inevitable necessity to accept a symbolic meaning for the very common words in the Vedas, such as 'agni', 'aśva', 'go', 'ghṛta', etc., because without doing so, the verses simply do not hold together.

'Usha' or dawn has always been described as 'gomati', 'asvavati'. If we insist on the literal meaning only, one wonders why the dawn is referred

to as having cows and horses. The words do not hold together to give out any comprehensive sense. It must be noted that the word 'go' also means 'light' in Vedic Sanskrit, and the word means 'asva' means 'energy'. Other interpreters have accorded to words changeable meanings and do not stick to one particular meaning. But Sri Aurobindo says, that if we were to consider the symbolic meaning each time, all verses hold together and reveal their hidden meaning. Thus, *usha* as 'gomati' even physically would mean, 'bringing the rays of light' and this is an image of the dawn of illumination in the human mind. And 'asvavati' comes from 'asva' meaning energy. Light and energy are two companion ideas that always go together, signifying mental illumination and vital energy.

Also, most often, the *ṛṣis* are shown as aspiring three things, namely, the sun, the cows and the waters. We wonder why the *ṛṣis* would pray to have more and more cows. The answer to this is the unfolding of a symbolic meaning of the words, which is:

The Sun – Truth consciousness
The Cows – inner Illumination
The Waters – Divine consciousness

Thus, their prayer for acquiring 'go' is not directed towards cows, but inner illumination, which is justifiably what the *ṛṣis* aspire for.

Again we have another verse:

"Evā hyasyā sūnṛtā, virapṣī... gomatī... mahī...,
Pakvā śākhā na dāśuṣe."[12] (1.8.8)

"Thus Mahi for Indra full of rays, overflowing in her abundance, in her nature a happy truth, becomes as if a ripe branch for the giver of the sacrifice."

Here, a simile is presented. As trees like mangoes, etc., with their flowers and fruits are beneficial, similarly the Vedas revealed by the God are givers of great knowledge. Only great seers can reveal this truth to others. This significantly shows the revealing character of the Vedas. But the translation of Gomati as (giver of cows/Indra) does not make sense in this context as has been earlier translated and interpreted by some.

Sri Aurobindo presents many more similar illustrations in his book *The Secret of the Veda*.

Sri Aurobindo did not arbitrarily accord random symbolism to words. He proceeded in a systematic manner by basing himself on the very language of the Veda, inquired into whether the words themselves indicated toward some psychological meaning beyond the material sense alone. He insisted on according to the terms an unwavering meaning for they have come down

as the diction of the seers based firmly on philological justification to begin with, befitting the context, and later relating it to psychological functions of Gods. If this leads us to clearer understanding of the verses, and all hold together as one great doctrine, then the method proves successful, and the undeniable sanctity and uniqueness of the Veda is unveiled.

Following the thread of his psychological theory, he says,

> Thus there emerged in my mind, revealing itself as it were out of the ancient verses, a Veda which was throughout the Scripture of a great and antique religion already equipped with a profound psychological discipline, a Scripture not confused in thought or primitive in its substance, not a medley of heterogeneous or barbarous elements, but one, complete and self-conscious in its purpose and in its purport, veiled indeed by the cover, sometimes thick, sometimes transparent, of another and material sense, but never losing sight even for a single moment of its high spiritual aim and tendency.[13]

Most Western interpretations have erred by the fact of looking at only the ordinary meaning of the word, unaware of the roots of the word, not going to the depths of its nuances, thus yielding a most inefficient and insufficient interpretation.

For example, there are numerous references to oceans and waters in the Vedas. Let us consider an example:

> Samudrād ūrmirmadhumān udārad, upāmśunā sam amṛtatvam ānat;
> Ghṛtasya nāma guhyam yad asti, jihvā devānām amṛtasya nābhih.[14]

> ... A honeyed wave climbs up from the ocean and by means of this mounting wave which is the Soma (amsu) one attains entirely to immortality; that wave or that Soma is the secret name of the clarity (ghrtasya, the symbol of the clarified butter); it is the tongue of the gods; it is the nodus (nabhi) of immortality.

[In this verse especially, it is clear that the sea, the honey, the Soma, the clarified butter are psychological symbols. They could not have been written in a purely physical sense of the terms. The seer could not possibly have meant that a wave of wine rose from the waters of the sea or the rivers, and this wine is a secret name for the clarified butter. The symbolism would probably point to the honeyed wave of *ananda,* (delight of existence), arising from the subconscient depth in us; and that we can arrive at immortality by this *ananda*. It is this *ananda* that is the secret reality behind outer actions of the mind in its shining clarities.]

The Vedas speak of two seas. Water for them is essentially a flood of consciousness, and the Ocean is seen in the image of infinite and eternal existence.

To further justify this interpretation, we can refer to verse 4.58.5; wherein Rishi Vamadeva cleary refers to the sea as 'hṛdyāt samudrāt' out of which arise 'ghṛtasya dhārāh'.

SARASVATI

Now, we come to Satasvati herself. Let us try to view another aspect of this goddess in the light of Sri Aurobindo's symbolic interpretation. Sri Aurobindo categorically states, "The symbolism of the Veda betrays itself to the greatest clearness in the figure of the goddess Sarasvati....She is, plainly and clearly, the goddess of the Word, the goddess of a divine inspiration...."[15]

The association of a river with poetical inspiration is also found in Greek mythology, in the form of the river Hippocrene, the fountain of the horse. This stream had sprung from the hoof of the divine horse, Pegasus. The stroke of the hoof on the rock releasing waters of inspiration is a psychological symbol. The symbolism of Sarasvati can be understood in a somewhat similar fashion.

"Pāvakā nah sarasvatī, vājebhir vājinivatī; Yajñām vaṣṭu dhiyāvasuh.
Codayitrī sunrtānām, cetantī sumatīnām; Yajñām dadhe sarasvatī.
Maho arnah sarasvatī, pra cetayati ketunā; Dhiyo viśvā vi rājatī."[16]

Word to word symbolic meaning follows:

Pāvakā	-	purifying
nah	–	our
sarasvatī	-	Sarasvati
vājebhir	-	with all the plenitudes of her forms of plenty
vājinivatī	–	rich in substance
Yajñām	–	sacrifice
vaṣṭu	–	may desire
dhiyāvasuh	–	by the thought
Codayitrī	–	the impeller
sunrtānām	–	of happy truths
cetantī	–	the awakener in consciousness
sumatīnām	–	to right mentalisings
yajñām	–	sacrifice
dadhe	–	upholds
sarasvatī	–	Sarasvati
Maho arṇah	–	great...flood (the vast movement of the ṛtam)
cetayati	–	awakens in consciousness
ketunā	–	by the perception

Dhiyo	–	the thought
viśvā	–	all
vi rājatī	–	illumines entirely

In the light of these word meanings, the complete translation would be thus in Sri Aurobindo's own words:

"May purifying Sarasvati with all the plenitude of her forms of plenty, rich in substance by the thought, desire our sacrifice."

"She, the impeller to happy truths, the awakener inconsciousness to right mentalisings, Sarasvati, upholds the sacrifice."

"Sarasvati by the perception awakens in consciousness the great flood (the vast movement of the *ṛitam*) and illumines entirely all the thoughts."[17]

"For these are the three Ṛiks devoted to Sarasvati, the divine Word, who represents the stream of inspiration that descends from the Truth-consciousness, and thus limpidly runs their sense."

Another interesting aspect would be to draw our attention to the initial naming of the rivers. A question arises: who has named the ancient rivers? The names have come down to us through scriptures and other literature; so it is fair enough to suppose that it was the *ṛṣis* who addressed particular rivers and mountains by particular names. Why a particular name for a particular river? Can't Gangā be called Narmadā, or Yamunā be called Vipāśā? Here, knowing the *ṛṣis* who have a unique faculty of inner perception, we can expect that they would have appropriately named the rivers in the light of what they represent and their inner relevance.

The word 'Sarasvati' itself in Sanskrit, means, 'one of flowing movement'. Considering that the waters symbolised floods of higher consciousness, to the Vedic Aryan this Sarasvati represented the flood of Truth-Consciousness (*ṛtam*), she was the embodiment of Divine Inspiration. It is again extremely significant to note that the Vedic Sanskriti, replete with culture and spirituality, developed on the banks of this very river, which was the Mother herself. She could very well have been their Inspiration for the Vedic compositions.

They also regarded her as their Mother, which is very clear in:

"Ambitame nadītame devitame Sarasvati
Apraśastā iva smasi praśastimamba naskridhi...".[18]

"Best of mothers, best of rivers, best of goddesses..."

Sarasvati is also spoken of as the secret self of Indra in the Vedas. This would certainly not make sense if we were to suppose Sarasvati to merely be a physical river and nothing more. Indra himself is much more than simply the God of the sky. He represents the illumined mind, and if we

consider Sarasvati to be the inspiration flowing from the higher plane into the mind; the concept makes perfect sense.

If this theory of the Aryan invasion were true, do we realise what it implies? It implies that the Vedas were composed by the nomadic tribes or semi-barbarians who came from the northern regions and settled in India. But, it is clear to us that the Vedas have to be the compositions of people who belong to this soil. P.T. Srinivasa Iyengar affirms,

> A careful study of the Vedas... reveals the fact that Vedic culture is so redolent of the Indian soil and of the Indian atmosphere that the idea of the non-Indian origin of that culture is absurd.[19]

CONCLUSION

The purpose of this paper is not to debate upon the validity of traditional commentaries. This symbolic interpretation presented by Sri Aurobindo has been proposed in this paper as an alternative viewpoint, which is certainly worth considering. In the light of this new interpretation, many more doors open up in front of us. His writing was always based on his own experiences in the course of his *sadhana*.

Obviously, we are not refuting that Sarasvati was the name of a river, in the ancient times, which later was buried into the ground due to several reasons. What I would like to add to this is that, it is not only a name of this river by coincidence. The river herself has a significance, a symbolism, which has been revealed in the Vedas. If we were to consider it, understand it and experience it, then, the regard we have for our heritage and for the *ṛṣis* who built and maintained the heritage, would rise to much greater heights. And very justifiably so.

> The *ṛṣis* arranged the substance of their thought in a system of parallelism by which the same deities were at once internal and external Powers of universal Nature, and they managed its expression through a system of double values by which the same language served for their worship in both aspects. But the psychological sense predominates and is more pervading, close-knit and coherent than the physical.[20]

Today, the scientific proof has changed the opinion of Westerners too.

> The belief in an Aryan 'race' had become accepted by philologists who knew nothing of science, what these men have written on the subject has been cast by historians into the limbo of discarded and discredited theories.[21]

As proud Indians, we do not now need to rely upon Western scholarship to agree and give the green signal that the invasion is a myth. It

is for us to defend our land, to stand up for our scriptures and argue our own case. The least we can do is to support the experts who are engaged in this research to unveil the hidden truths of our scriptures, 'the Secret of the Veda'.

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19

Democratic Assemblies in the Vedic Era

Shashi Tiwari

The Vedic era encompasses the Āryāvarta Civilization which has been lost almost 5000 years back, but the solidarity of its cultural traits have formed an undercurrent of unbroken chain right up to the present age. We find from the Vedas that the Āryan society during the early Vedic period was theoretically organised on the basis of political institutions and was governed almost by the king or the elected leader. The characteristic features of the Vedic polity have been concentrated on its three important institutions, viz. the kingship, the king's entourage and the popular assemblies. The popular assemblies and institutions of earlier Vedic period are known by the names, such as–*Sabhā, Samiti, Vidatha* and *Pariṣad*. The political life and activities of the state are expressed through them. This paper attempts to analyse the nature, origin, constitution and functions of the Vedic popular assemblies, especially the *Samiti* and the *Sabhā* to determine the democratic elements in governance of the Vedic times.

Regarding the political organizations of the Vedic age, we find from the Vedas that the family (*Gṛha* or *Kula*) was the ultimate basis of the Vedic state. A number of families, connected with ties of kinship, formed the *Grāma* (village). An aggregate of villages made up the *Viś* (district or clan) and a group of *Viś* composed the *Jana* (tribe). The tribe was under the rule of its chief or king (*Rājan*), who was often hereditary, as would appear from several lines of succession mentioned in the *Ṛgveda*. Occasionally the *Rājan* was elected by the *Viś*, but it is not clear whether the choice was limited to members of the ruling family or was extended to other noble families. The king ensured the protection of his people and in return they rendered him obedience or gave voluntary gifts. The king dispensed justice and performed sacrifices for all types of prosperity of the state. The *Purohita*, the *Senānī* and

the *Grāmanī* were the most important members of the royal entourage. The king was by no means an autocrat, probably his powers were limited and functions were checked by certain institutions and assemblies.

The earliest work of the Āryans, the *Ṛgveda* mentions that the king or the emperor used to attend *Sabhā*,[1] *Vidatha*[2] and *Samiti.*[3] In the Atharvaveda the terms *Sabhā* and *Samiti* are used to explicate two different concepts. It is clear that the words are used to refer to two different types of organizations.[4] In another verse of the *Ṛgveda*, Soma is said to confer a son who is *Sādanya, Vidathya* and *Sabheya,*[5] from which it follows that *Sabhā* is in some respects different from *Vidatha*. Evidently, therefore, all the three names express three distinct form of institutions during the Vedic era. Amongst them *Vidatha*, frequently mentioned in the Vedic texts and mainly confined to the Ṛgveda, is a word of obscure sense. *Sabhā* and *Samiti* are mentioned respectively only 8 and 9 times in the *Ṛgveda* and 17 and 13 times in the *Atharvaveda*, whereas *Vidatha* is mentioned 122 times in the *Ṛgveda* and 22 times in the *Atharvaveda*. From the relative references in the Vedic literature we may say that *Vidatha* was more important in the early Vedic period whereas *Sabhā* and *Samiti* became so in the later Vedic age.

The term *Vidatha* has been interpreted by many scholars differently.[6] Prof. Ghoshal, while referring to different explanations of the scholars, concludes that "in view of these differences it seems impossible to predicate any certain attribute of the Vedic Vidatha." V.P. Verma thinks that "the *Vidatha* seems to be a spontaneous and occasional assemblage rather than a regular and formal one like the other two." This term seems to denote a council or folk-assembly mostly related to religious activities, sacrifices or knowledge-sessions. R.S. Sharma has justly pointed out that, "it was attended by men and women, performing all kinds of functions-economic, military, religious and social. How far the *Vidatha* served as an instrument of government is difficult to determine".[7] So in the absence of any distinctive political characteristic of the Vedic institution called the *Vidatha*, here only the words *Sabhā* and *Samiti* are taken under consideration.

The *Sabhā* and *Samiti* are examined by R.K. Mookerji as "the original and earliest institutions of Indian polity".[8] They prove the existence of democratic elements in Vedic era, as A.C. Das opines that,

> "a people with democratic instincts like the Vedic *Āryan*s, quite alert to and mindful of their own tribal interests could not but frequently meet in the assemblies to discuss village and public affairs and express their opinions freely on matters that concerned them most intimately."[9]

Of these two again *Sabhā* is of greater antiquity because often later *Samiti* is used sometimes in connection with *Sahhā*.[10] In the *Atharvaveda* both

of these are noted as two daughters of Prajāpati and this shows their equal importance.[11] The verse says, "*Sabhā* and *Samiti* are daughters of Prajāpati. They have coordination. May they protect the nation. They guide the people. May I speak in the assemblies gently." Both the words occur several times in different Vedic texts. Hillebrandt holds the view that both are indistinguishable and meant the one and the same thing.[12] Keith thinks both are much the same.[13] But Vedic evidences show their difference.

NATURE AND FUNCTIONS OF THE *SAMITI*

The word *Samiti* (Sam+iti) literally means 'meeting together' or 'an assembly, which is attended by all persons.

On the basis of certain Vedic references the scholars have presented their opinions on the subject differently. According to Rahul Samkrityayana *Samiti* was the name of the national assembly or parliament in the Ṛigvedic period.[14] K.P. Jayaswal thinks that the *Samiti* was the national assembly of the whole people or *Viśaḥ*, electing and re-electing the *Rājan* or the king. Its most important function was to elect the king. Thus it was a sovereign body from the constitutional point of view.[15] A.C. Das opines that the *Samitis* were held on special and important occasions in the capital towns and attended by all the people or their representatives living in the town as well as the interior villages.[16] 'The *Samiti*', according to N.C. Bandyopadhyaya was 'a gathering of the whole folk of the community', 'the assembly of the *Rāṣṭra*.'[17] 'Though the *Samiti*' says A.S. Altekar, "sometimes meant a social gathering, it usually stood for a political assembly of the central government". He admits that we are completely in dark as to the constitution of this important body.[18] V.M. Apte states that the *Sabhā* and the *Samiti* in the *Ṛgveda* are different to distinguish, the *Samiti* may provisionally be said to have been "an august assembly of larger group of people for the discharge of tribal (i.e. political) business and was presided over by the king".[19] P.V. Kane after discussing on the *Samiti* concludes

> 'it is impossible to say how the *Sabhā* or *Samiti* was constituted in the Vedic period. All that we can say is that it was an assembly of people to which the king, learned men and others went. It is extemely doubful whether it was an elective body. Probably it was an ad hoc assembly of such people as cared to be present.'[20]

U.N. Ghosal rejects the idea of Jayaswal, Altekar, etc. and concludes that "the *Samiti* was the folk-assembly par excellence of the Vedic Āryans and occupied such a position of sufficient importance to make it the king's most valuable asset".[21] So a fresh review based on the study of Vedic texts is required on this subject.

The *Samiti* was assembly of the whole people (*Viśaḥ*), attended by the *Rājan* or king. A verse clearly says "May all the people wish these for their king."[22] *Atharvaveda* mentions that the *Samiti* was of great importance for which the prayer was pronounced to the effect that the stability of the king would depend on *Samiti*.[23] There are clear signs that concord between the king and assembly were essential for his prosperity.[24] The *Atharvaveda* says that it was the *Viśaḥ* who accepted one into kingship.[25] This passage refers not to the election of the king by the clan, but to his acceptance by the subjects. The *Ṛgveda* points out that a true king has to attend the *Samiti*.[26] It may he assumed that if he did not attend it, he would be considered 'untrue'. It was a practice that kings or nobles should assemble in the assembly.[27]

Later Vedic references prove that the *Samiti* acted as a national academic assembly also. The *Chāndogya* and *Bṛhadāraṇyaka Upaniṣads* relate the visit of Śvetaketu to the assembly called *Samiti* of the Pāñcāla country where the King Pravāhaṇa Jaivāli asked him five philosophic questions which the former could not answer and then he had to go away with the remark of Jaivali "How could anybody who did not know these things say that he had been educated?"[28] While the king's presence in the *Samiti* is noteworthy here, it is also noticeable that for the *Samiti* another word *Pariṣad* is used simultaneously.

In the *'Saṁjñāna-sūkta'* of the *Ṛgveda* the word *Samiti* literally means 'union or meeting', where it is used with *Mantraḥ, Manaḥ* and *Chittam*.[29] Here the prayer is for common meeting (*Samiti*), common thought (*Mantra*), common mind (*Mana*) and common realization (*Citta*), etc. So it prays that the deliberation of the *Samiti* should be harmonious and the mind of its members well-disposed towards one another and its conclusions unanimous. In another verse of the *Ṛgveda* again the word *Samiti* is found with the words *Citta* (mind) and *Vrata* (action)[30] and perhaps denotes the sense of peace and smoothness of mind and action during association. Thus it is reasonable to predict that in the *Ṛgveda* the term *Samiti* is related to a 'meeting' or a 'meeting place' for discussions. Later in the *Atharvaveda* there are few verses, showing the deliberative functions of the *Samiti* and the *Sabhā*. The seer prays to both *Sabhā* and *Samiti* for their concurrent aid and wishes that he may speak what is pleasant among those who have come together, that all the *Sabhāsads* may be 'of like speech' with him and give up their splendour and discernment (*Vijñāna*) to himself and that he may be the possessor of fortune (*Bhagin*) of the whole gathering (*Saṁsad*).[31] Another passage also describes about the importance of sweet speech in the *Samitis*.[32] It shows that in the *Samiti* during deliberations, speakers were anxious to make speeches. A Vedic text quoted in the *Pāraskara Gṛhyasūtra* also states

that the speaker wanted to prove himself 'brilliant, not to be contradicted' in the *Samiti*.[33] The persons were desirous of victory over the discussion, is hinted in another prayer of the *Atharvaveda*.[34] A reference in the *Atharvaveda* seems to indicate that only that person was considered successful who has won over the *Samiti* or who is approved by it.[35] However, we have no adequate evidence as regards the subject of deliberations in the *Samiti*, it may be assumed simply that general deliberations on policy of all kinds used to take place there. Even the gods had a *Samiti*, hence called *Devatātā*.[36]

Thus three points are quite clear. Firstly, the *Samiti* was a meeting place for all the people. It was a popular assembly which could be attended by all *Viśaḥ*, irrespective of class, rank and wealth. It was an assembly to which the king, learned men and others went. Secondly, king's presence in the *Samiti* was almost compulsory. It was in his favour to get support and protection of this assembly. Sometimes it seems to be a constitutional check upon the king. Probably he was invited to attend it as its head to preside over its deliberations. The *Pāraskara Gṛhyasūtra* indicates that the *Pariṣad* had its *Īśāna,* i.e. president.[37] But the *Pariṣad* is identical with the *Samiti* and it was the king as *Īśāna* is not proved from any reliable reference found in the Vedas. Although his presence in the *Samiti* is recorded several times, but the question of his election by the people in the *Samiti* is extremely doubful. Thirdly, all sorts of general deliberations were the main functions of the *Samiti*. In the Vedic age the *Samiti* is considered as ancient and eternal as a daughter of Prajāpati, the creator. Its continuous existence is seen from the *Ṛgveda* to the later Upaniṣadic literature and thus proves its democratic character and functions in a sort of republican state of the Vedic era. Jayaswal's finding that the *Samiti* disappeared before the time of the *Jatakas* (600 BC)[38] points out that with the rise of imperial epoch its existence was not required.

NATURE AND FUNCTIONS OF THE *SABHĀ*

There was another important constitutional organism in the Vedic times known as *Sabhā*. Its exact character is not certain from the Vedic references. It is described as a sister of the *Samiti* and a daughter of Prajāpāti, the creator in the *Atharvaveda*. It is undoubtedly related to the *Samiti*, but its relationship with it is not known from the Vedas. It was considered almost as important as the *Samiti* and was attended by the king and nobles. Certainly *Sabhā* is the name of an 'assembly' as well as of the 'hall' where people met in assembly in the Vedic era.

Let us now examine the views of the different scholars regarding the Vedic *Sabhā*. According to Rahul Samkrityayana the term *Sabhā* is used in

the *Ṛgveda* in a wider sense as not only political assembly of village, nation and people, but also gambling halls and some other gatherings.[39] Jayaswal agrees that the expression *Sabhā* is used in several senses in the Vedic literature, but in constitutional sense, probably it was a standing and stationary body of selected men working under the authority of the *Samiti*. According to him the *Sabhā*, a body of elders with its president called *Sabhāpati*, acted as a national judicature like the modern criminal courts.[40] A.C. Das states on the subject that every important village, had a permanent institution of its own, which was known by the name *Sabhā*. The *Sabhā* had a house or hall of its own, where the elders and all respectable persons, whether young or old, regularly met not only to talk on important village topics, like cows and probably cultivation, rain or crops, but also to while away their idle time in dice-playing. The *Sabhā* thus assumed the character of an assembly as well as a club.[41] According to N.C. Bandyopadhyaya *Sabhā* which may he designated as 'the political council' had little connection with the village, but it was a central aristocratic gathering associated with the king. He also thinks that the *Sabhā* acted as a judicial assembly, the members acted as assessors and it was presided over in a later age by the king himself.[42] Louis Renou also states that *Sabhā* seems to be an assembly of limited size, partly judicial in nature.[43] A.S. Altekar admits that the *Sabhā*, as a separate body, was 'primarily the village social club'. He speaks of the high status of the members of this body and says that "sometimes it was associated with the king and was more a political than a social gathering". Lie concludes that, "the *Sabhā* was usually the village-assembly, meeting for social as well as political purposes."[44] V.M. Apte also states that "The *Sabhā*, a more select body was less popular and political in character than the *Samiti*."[45] Zimmer tries to identify *Sabhā* with the village on the evidence of the *Vajasaneyi Saṁhitā* (3.45). He thinks that *Sabhā* was the meeting place of the village-council, presided over by the *Grāmaṇī*.[46] According to Ludwig the *Sabhā* was an assembly not of all the people, but of the Brāhmins and *Maghavans* or rich patrons.[47] In P.V. Kane's opinion *Sabhā* was in some respects different from *Vidatha* but the words *Sabhā* and *Samiti* are applied to the same assembly.[48] After examining several views U.N. Ghosal is convinced that the *Sabhā* was the parallel assembly which enjoyed equal prestige.[49]

After quoting the views of the scholors related to the nature and functioning of the Vedic *Sabhā* it seems desirable to discuss the Vedic references for reaching any conclusion. An Atharvavedic hymn describes the importance of the *Sabhā*.[50] Here the king has wished protection or aid from the *Sabhā* also. Prayer for co-operation in the *Sabhā* shows that discord in the *Sabhā* assembly was as much disliked and dreaded as in the *Samiti*.

The *Sabhā* is called by the name '*Nariṣṭā*'. With reference to this name, the speaker desires that "all those who sit assembled in the *Sabhā*, utter speech in harmony with me". This peculiar word '*Nariṣṭā*' has been explained differently. It has been translated as 'mirth' by Bloomfield and as 'sport' by Whitney and Lanman.[51] But Sāyaṇa has described the term as a 'resolution' of many 'that cannot be broken or violated. Hence from the inviolability the name is derived'.[52] It means to say that free discussion was held in the *Sabhā* and a resolution of the *Sabhā* was considered binding on all and was inviolable. Thus *Sabhā* seems to have acquired, a democratic function.

Etymologically *Sabhā* means 'a body of men shining together'.[53] *Sabhāsad* and *Sabhācara*[54] were those persons, entitled to a seat therein and were able to attend it. They, therefore were considered lustrous and famous. The *Sabhā* had its president also know as *Sabhāpati*. Respect was not only due to him but also to the entire *Sabhā*.[55] Probably elders in the body were holding this post.[56] '*Sabheya*' adjective applied to a Brahmin (*Vipra*) supports the view that 'being worthy of assembly' was a distinction.[57] The birth of a Sabheya son was earnestly desired by fathers.[58] The *Atharvaveda* states that all the members of the assembly must comply with the rules and regulations, only then assembly would be safe.[59] Similarly wealth (*Rayi*), which is *Sabhāvān*, i.e. 'fit for the assembly' is praised.[60] The high social status of the members of the *Sabhā* is proved by the verse in which the seer says to Indra that he would go to the *Sabhā* pleasing like the moon.[61] Thus from these evidences it may be assumed that the *Sabhā* was an assembly of the highest dignitaries or wealthy persons also. The Ṛgveda gives a word '*Sabhāsāha*,[62] describing a friend who has come back successful from the *Sabhā*. It shows how the Vedic people were eager to gain eminence in the assembly, obviously not for their skill in playing dice, but for their ability in debate or their rich patronage. Presumably it was an assembly not of all the people, but only of the respectable, cultural and rich section of it. It was a place to gain eminence and fame. There is no doubt that in the Vedic period it was also a simple village assembly, where all important transactions of the public life were carried out, such as general conversation, debates, social intercourse and gambling.

Thus on the basis of Vedic evidences, we are able to study the political life and activities of the earlier Vedic days to some extent. The existence of the *Samiti* and *Sabhā* expresses democratic element in the Vedic political thought, because both these popular assemblies enjoyed the right of debate and discussion. Generally they were open to a large group, but the *Samiti* was chiefly attended by *Viśaḥ* and the *Sabhā* mainly by *Vipra* and *Maghavans*. Both were graced by the presence of the king, headman or nobles. Their

protection and aid were desired by all. They were the symbol of dignity, discipline and freedom of expression for the Vedic Āryans. However their exact constitutional composition is not clearly described in the Vedas, we may conclude with the remark that they were the popular democratic assemblies of the Vedic era.

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22. *Viśastvā sarvā vāñchantu/ RV* 10.173.1; *AV* 6.87.1.
23. *Dhruvāya te samitḥ kalptāṁiha/ AV* 6.88.3.
24. Keith, *Vedic Index*, Vol. II, 431.
25. *Tvām Viśo Vṛṇtām rājyāya/ AV* 3.4.2.
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27. *Yatrouṣadhīḥ samagmataḥ rājānaḥ samitāvijyat/ RV* 10.97.6.
28. *Chān*. Upa. 5.3; *Bṛha. Upa.* 6.2.
(*Pañcālānām Samitimeyāya, Pañcālānām pariṣada-mājagāma.*)
29. *Samāno mantraḥ samitiḥ samānī samānam maṇaḥ saha cittameṣām/ RV* 10.191.3.

30. *Ā Vaścittamā vo Vratamā vo'ham samitim dade/ RV* 10.166.4.
31. *AV* 7.12.1-3, 15.9.2-3.
32. *Ye saṁgrāmāḥ samitayasteṣu cāru vademe te/ AV* 12.1.56.
33. *Pāraskara Gṛhyasūtra,* 3.13.4.; Jayaswal, *Hindu Polity*, p.13.
34. *AV* 2.27.
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50. *Sabhā ca mā samitiścāvatām*
    prajāpaterduhitarao saṁvidāne/
    Yenā saṁgacchā upa mā sa sikṣā-
    ccāru vadāni pitaraḥ saṁgateṣu
    Vidma te sabhe nāma nariṣṭā nāma vā asi
    Ye te ke ca sabhāsadaste me santu savācasaḥ// AV 7.12.1-2; 15,9,2-3.
51. Bloomfield, *Atharvaveda* (SBI, 42), p. 138; Whitney and Lanman, HOS, Vol. 18, p. 391.
52. *Nariṣṭā ahiṁsitā parairanabhibhāvyā.....bahavaḥ saṁbhūya yadyekam vākyam vadeyustadhi na parairatilangham/ Ataḥ anatilaṅghyavākyatvād narṣṭeti nāma sabhāyā yujyate/ AV*, Sayaṇa 7.12.2.
53. *Saha dharmeṇa sadbhirvā bhātiti sabhā/ Pāraskara Gṛhyasūtra*, 3.13.1.
54. *AV* 17.13.2; *VS*. 30.6; *AV* 19.55.5.
55. *Namaḥ sabhābhyaḥ sabhāpatibhyaśca/ YV* 16.24.
56. Jayaswal, *Hindu Polity*, p. 18.
57. *Sabheyo vipraḥ bharate matī dhanā/ RV* 2.24.13; 1.91.20.
58. *RV* 7.5.18.
59. *Sabhyāḥ sabhām me pāhi ye ca sabhyāḥ sabhāsadaḥ/ AV* 19.55.5.
60. *RV* 4.2.5.
61. *RV* 8.4.9.
62. *Sarve nandanti yaśasāgatena sabhāsāhena sakhyā sakhāyaḥ/ RV* 10.71.10, 6.28.6. [Presented in *the 36th International Congress of Asian and North African Studies* at Montreal, Canada on Aug. 27-Sep. 1, 2000.]

20

The Incredible River, Sarasvati – A Journey from Myth to Reality

Rajesh Purohit

The journey from myth to the destination of reality with the object to unravel the truth about an incredible river that has metamorphosed into a myth in the Indian psyche, a river that has produced a mighty civilization spreading over almost 11,00000 sq. km., the river on the bank of which the epic, literatures and philosophies were conceived and the river where an unending tradition have been practised for more than five thousand years, is not only thrilling but an enlightening one. This incredible river is none other than the mighty Sarasvati which has been eulogized in *Ṛgveda* as *Ambitame*, *Naditame Devitame Sarasvati* – *Ambitame*, the best among the mothers; *Naditame*, the best among the rivers; and *Devitame,* the best among the goddesses.

The amazing early Indian civilization flourished on the bank of the incredible river Sarasvati and Indus in the first phase and then subsequently shifted to the *doab* of Yamuna and the Ganges.

The saga of Indian culture has been unfolded through scientific archaeological excavations on the banks of lost bed of Sarasvati, Drishadvati, Indus, Sutlej, Ghaggar, Yamuna and Ganga. The explorations and excavations in the post-independence era have revealed astounding evidences pertaining to the river Sarasvati and its tributaries. Rakhigarhi (Hissar, Haryana) on Drishadvati, Bhirdana, Kunal and Banawali (Fatehabad, Haryana) on the ancient Sarasvati or Ghaggar reveal adequate evidences pertaining to pre, mature and post-Harrapan Civilization from (4000 BC to 1700 BC). The data also indicates how the birth of a civilization took place in the newly discovered sites on the bank of Sarasvati in Haryana

rather than the Harappa and Mohenjo-daro whose dates are comparatively much late than Bhirdana, and Kunal. It also shows that how slowly the civilization was reaching to its highest water mark and eventually declining due to desiccation of the river and ushering into a new civilization called Indo-Gangetic Civilization on the banks of Indus, Yamuna and Gangetic Valley. The findings of Bhagawanpura at Kurukshetra are important because it is one of the rarest sites that yielded late Harappan antiquities along with Painted Grey Ware culture, indicating the emergence of PGW in the late Harappan time. This phenomenon can also be interpreted environmentally as how with the passage of time with the decline of major sources of glacier waters, the river either lost its course or was captured by later river systems such as Indus, Sutlej and Yamuna. Newer civilization emerged and flourished on these banks the Ganga and Yamuna (erstwhile Chambal) which is a tributary of the Ganga, captured the Sarasvati source at Paontasaheb (the site is known as a Sikh shrine in Himachal Pradesh). Owing to river capturing, Sarasvati was deprived of the perennial source of molten glaciers from the Himalayas. As the river started drying-up, people slowly started migrating into eastwards towards the Ganga-Yamuna *doab* or westward towards Indus and Sutlej.

The modern search for Sarasvati on the ground level started in 1893 by C.F. Oldham an engineer when he was riding his horse along the dry bed of a seasonal Rajasthani river called the Ghaggar. He was of the opinion that the bulk of the water of ancient Sarasvati was contributed by Sutlej which latter changed its course and became a tributary of the Indus. Most geo scientist believe that neo tectonism and river capturing or piracy caused the eastward diversion of the water of the Sarasvati and westward drifting of Sutlej to became a tributary of Indus. This has been substantiated by archaeological findings in the region of Indus and Yamuna during the so-called Mature Harappan period in the Indus and its tributaries and later during the Harappan and PGW periods at the recently excavated sites such as Saloni and Daksha Khera on Yamuna.

The Landsat imageries, Satellite images of the palaeochannels, geological and sediment logical data and groundwater surveys and the presence of thousands of archaeological sites yielding human antiquity for more than five thousand years have significantly contributed many facts about the existence of a mighty river which for a considerable time, considered as a mythical river.

The Satellite data precisely on the toposheets of Haryana, Rajasthan and Gujarat along the track of the lost Sarasvati vindicates many archaeological sites of historical and cultural importance showing the

signature of river Sarasvati and Drishadvati right from Siwaliks to Bhatner desert and further joining at the confluence on the Arabian Sea in Gujarat.

- The excavation at Bhirdana on the bank of Sarasvati in Fatehabad district has brought sensational results as the antiquity of the sites dates back to 4565 BC which suggests the civilization on the bank of Sarasvati is considerably older than the Harappa and Mohenjo-daro (c. 2200 BC) pottery.
- Some semi-precious stones.
- Structures made of Sun-dried bricks.
- The excavators have also discovered a 2.4-metre-wide wall considered to be the fortification wall of the township on the excavation site.
- Clinching evidence of the township was that the earth outside the wall comprised of virgin soil while the one inside the fortification wall had all the evidence of structures.

The excavation at Kunal in Fatehabad district has revealed that the antiquity of the civilization in this region that dates back to 3200 BC. The site has yielded pit-dwelling settlement, pottery resembling that of the Baluchistan region, bead manufacturing centre, two royal silver crowns of Harappan period and many more.

- Neolithic tendency.
- Pit-dwelling.
- Pre-Harappa.
- Mature Harappa
- Circa 3200 BC.
- Unique objects of Regalia.
- Steatite button seals show its ancestry to Rehaman-Dheri, Baluchistan–two deers on (Obv.) geometric design on (Rev.) c. 4000 BC.
- Small gold beads.
- Oval-shaped ovens.
- Largest living pit with a floor made of fine clay and cow dung.
- Copper furnace with smelting material.
- Steatite button seals shows its ancestry to Rehaman-Dheri, Baluchistan – two deer on (ob)geometric design (Rev) c. 4000 BC.
- Copper ingot and slag.
- Double-tanged arrow head, rods, rings, bangles, bone points, blades.
- Beads–terracotta, steatite, agate, lapislazuli, carnelian, faience.

- Terracotta balls, net sinkers, animal figurines, wheels toy cart frames, shell bangles.
- Grey ware with geometric design, natural motif and graffiti affinity with Gomal Valley in Baluchistan.
- Largest living pit with a floor made of fine clay and cow dung.
- Kunal–fresh running water aquatic molasses oyster.

Banawali yet another site on the bank of Sarasvati in the same district has unearthed antiquities pertaining to the early Indus and matured Indus Civilization which includes antiquities of typical Harappan settlement of grid pattern, wells, terracotta plough, micro weights and many more.

- Banawali is a pre-Harappan and Harappan site.
- Evidence of **ploughed fields** has been found.
- Large quantity of **barley and evidence of growing of sesame and mustard.**
- The use of **wooden plough to plough** the fields.
- A **fortified town (2500-1700 BC)**.
- Banawali – The name Banawali etymologically means series of forests or rows of Ban or forest. Interestingly **among the faunal evidence a complete skeleton of a baby elephant suggesting a forest area.**
- **Kurukshetra was known as Kurujangal.**
- Technology of copper smelting.
- Ornaments, beads of gold, semi-precious stones, terracotta and steatite and bangles of clay, shell, faience and copper.
- While the pre-Harappan culture was still young, a new set of people occupied Banawali.
- They soon built a well planned and fortified township in the *classical chessboard pattern*.
- The broad arterial streets, running from north to south, have been found straight and uninterrupted, whereas those, running from east to west, were usually narrow and staggered.

Balu (Kaithal), a pre-Indus-Sarasvati site on the bank of river *Apaya* or *Apaga*, a tributary of Sarasvati. References are made to *yajnas* performed by King Citra on the banks of the river Apaya, a branch of the Chitang River.

- *Apaga* or *Apaya* a Rigvedic river.
- Pre-Harappan–Grey, Red, Buff, Black and Red Ware–Storage jar, pot, etc. Terracotta bangles and structure in mud bricks.

- Harappan–Perforated jar, dish on stand, goblet, beaker-decorated with *pipal* leaves, intersecting circles, etc., Terracotta, triangular terracotta cakes, animal figurines, toy carts, wheel, bull, disc, bone points, stone pestle, steatite disc beads, faience bangles, copper objects.
- Evidence of orientation of streets and Fort of Harappan period.
- 10 m wide platform made of large bricks.
- Late Harappan–Dish on stand, storage jar kiln, ovens, mud walls, mud bricks structure.

Bhagwanpura (Kurukshetra), a unique site showing the interlocking phase of Indus and Painted Grey Ware culture identified as the culture of Mahabharata period on the right bank of river Sarasvati.

- On the bank of Sarasvati.
- Harappa and PGW.
- Glass.
- Daulatpur–Inscription on a clay tablet bearing name *Sthaneswarasya.*
- Sthaneswar, capital of Harsha.
- Shakti peetha Savitri Sthanu.
- Pehwa-Prachi–Eastern Saraswati.

Daulatpur (Kurukshetra), a site yielding the antiquity from late Indus to medieval period. The most interesting finding is an inscription inscribed *Sthaneswarasya* dated back to 6th or 7th century BCE.

Mirzapur (Kurukshetra) another Late Indus site along with the historical deposits from Kushana and medieval period.

Raja Karna ka Qila (Kurukshetra), yields antiquity from the Northern Black Polished Ware to medieval times, c. 800 BC to AD 1600.

Thanesar (Kurukshetra), the ancient capital of Harsha Vardhana of the Pushyabhutis excavation unearths antiquity uninterruptedly from the pre-Kushana to late medieval period.

- Harsha ka Tila.
- Capital of Harsha.
- Bana Bhatta–*Harsha charita.*
- 2000 years antiquity.
- Daulatpur.
- *Sthaneswarasya*.
- City on the bank of Sarasvati.
- Savitri and Sthanu.
- Huien Tsang tsang' Record.

The scientific excavations of these sites on the bank of Sarasvati have revealed the story of Kurukshetra from 4000 BC to contemporary times without any significant gap.

The search for Sarasvati eventually delivered not only an incredible heritage but also the wealth of groundwater in the form of palaeochannels, the precious among the human needs especially in the drought prone and arid zones like Rajasthan, Haryana and Gujurat. The existences of palaeochannels and groundwater resources within a depth of 30 to 60 metres below. There is a possibility of constructing one million sustainable tube wells in the central Sarasvati River basin alone to augment the water resources of the region.

Extreme in the western Rajasthan desert, in Pakistan side of Thar Desert not far from the border with India in the area lying between Fort Abbas and Dilawar Fort, sensetional occurrence of huge quantity of fresh ground water was found almost in a volume of about 10 km. It has occurred along the course of ancient river bed of Sarasvati or Ghaggar. This discovery could virtually transform the lives of thousands of locals in Pakistan who were experiencing harsh water shortages. Similar kind of augmentation of groundwater has been done in India by ONGC at Jaisalmer that which ultimately met the thirst of millions.

Satellite images in possession of the ISRO and ONGC have confirmed that the major course of a river, the Sarasvati, ran through the present-day Ghaggar River, which passes through parts of the states of Haryana, Rajasthan and Gujarat including the channel that enters parts of Jaisalmer in Rajasthan and adjoining regions in Pakistan before discharging into the Rann of Kachchh.

The Sensational archaeological finding of an ancient river bed on the north of Kurukshetra has been discovered by the author after a meticulous study of palaeochannels of Haryana. The river bed has been found adjacent to an archaeological site known as Bhore Saidan, 13 km from Kurukshetra on Pehowa Road. It has proved what G.E. Pilgrim had presumed long time back. G.E. Pilgrim had published a landmark paper drawing attention to an alluvial deposit of great antiquity found stretching all the way from the Himalayan foothills to the Sindh gulf. Pilgrim imagined the deposit to have been laid by a primitive river that he named as Siwalik River which is none other than Sarasvati.

The cynosure of all eyes is on a huge river bed of river Sarasvati. It has been confirmed from the palaeochannel that a buried channel is there beneath Bhore Saidana. A large number of images of the palaeochannels, buried rivers, old alluvial soils have been mapped on toposheets from the

Satellite which also shows distinct channels below the archaeological sites of Haryana. For the first time in the history a buried river bed containing huge amount of sand with mica, monazite, etc. have been found at a depth of about 30 feet in a rain gulley of the archaeological mound. The river bed has seven layers alternatively carrying sand and an alluvial clay deposits.

Water carrying ore particles from an aquifer underneath the soil of a palaeochannel were revealed from Kalayat has further substantiated the findings of the river bed by the author. The oil giant ONGC is out to explore the course of the mythological Sarasvati River at Kalayat, in Kaithal and Kurukshetra districts, after an artesian well with particles of and mica was discovered in January during the excavation of a sacred pond at Kalayat in Haryana along the river track of lost and buried Sarasvati.

Now the point of contention clear we should cross our fingers to explore more data and give a second thought before we call Sarasvati a mythical river. The revival of the Sarasvati River will benefit the country both in terms of augmentation of ground-water from the palaeochannel of Saraswati in the area where water has been a crisis and secondly the Sarasvati project will enable the scholars to re-examine the mysteries Aryan invasion, mythical Sarasvati River, and the date of event of Mahabharata.

The journey in the quest of Sarasvati from myth to reality has not completed with the discovery of latest findings, rather it is the stepping stone to perform the unique journey for unearthing data with regard to the origin of the river, locating the complete track and route of Sarasvati and the reasons that led to the dedication of the river.

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Search for Himalayan Antecedents of the River Sarasvati

C.R.B. Lalit

INTRODUCTION

The mystery of the origin of the river Sarasvati has baffled historians and the geologists alike. Recorded history finds no mention of the river. The living Hindu tradition has further compounded the confusion because it recognizes more than half a dozen Sarasvatis throughout the length and breadth of the country–one in Badri Kedar, one in Kashmir, one in Himachal, one in Haryana, some in the eastern parts, some in the west and some in the south including a Shani Sarasvati. Similar confusion prevailed about the route it flowed through. The Vedic texts sang hymns in praise of a rich Sarasvati Valley civilization transcending down from the Himalayas to the Arabian Sea and that too at two different locations one at the Rann of Kachchh, after the level of Rann increased, the river crossed the Rann to join Arabian Sea at the Gulf of Khambat. The *Puranas* tracked down from the Himalayas to the confluence of the Ganga and Yamuna where it is still perceived as flowing though invisible. This is true because the Sarasvati waters flow along with the Yamuna. Therefore, though invisible it joins the confluence at Prayag.

The *Puranas* helped archaeologists and modern day historians in tracing its course through Punjab, Haryana, Rajasthan and Gujrat with the help of precision equipments, deep drilling machines and archaeological sites attributed to its banks, but the *Puranas* also created misapprehensions by saying:

Plaksh vrikshat sambhuta sarichhreshtha Sanatani

(Lomharshan Rishi)

and

Tasmin plakshe sthithan drishtva Markandeyo Mahamuni
Pranipatya tadamurdhna tushtvath Sarasvatim

(Vaman Purana)

Concluding that Sarasvati is seen at the roots of a *plakshas* tree. Impressed by this declaration of the scriptures, we like in all other matters – stopped our search at Adi Badri located at the boundary of Himachal Pradesh (Sirmaur) and Haryana (Bilaspur). We did not go into the fact of various tectonic upheavels the Himalayas have seen down the millennia since the Vedic period. Geological changes have metamorphosed the Himalayan topography beyond Adi Badri to such an extent that it becomes unbelievable that a river could cut through a cordon of mountain ranges spread horizontally over the area beyond Adi Badri. Even when some historians thought of Sarasvati as a glacier originated river system, they looked for an easy solution in Tons (Puranic Tamsa of Tapti) and concluded that Sarasvati originated from Rupin and Shupin streams which actually form the river Tamsa at their confluence at Naitwar in Uttrakhand. They found themselves misled by the overhanging glaciers at the source of Rupin khad. But daughters of Surya, the Sun God, the Yamuna and Tamsa or Tapti have a separate puranic existence and have no truck with Sarasvati although they joined Sarasvati to loose their own identity in the Shivalik foot hills of Kiarda doon, i.e., the modern day Paonta Valley of Sirmaur. Needless to mention that Sarasvati has been a mightier river than the Yamuna which had an independent drainage system of its own. This writer has tried to trace out a the Sarasvati River system in the Himalayas beyond Adi Badri. We have a river as big as the Yamuna discharge of which matches that of the Yamuna when it meets the later near Rampurghat opposite Bhagani in Paonta area. Its name Gira known to the locals for centuries is just a synonym of Sarasvati. Modern day geologists have recorded it as Giriganga adding a legend of a Sadhu who had brought water from Haridwar with him which fell down from his Kamandalu at Kupad Tiba forming boundary of Jubbal and Chopal tehsils in Shimla district. This legend though an aberration caught the fancy of the people as adding Ganga to any stream's name brings it honour. But honour Gira already had attached to it because the people in this Himalayan region used to immerse the *pushpas* (*assthis*) of their dead at Giriganga *tirtha* about 8 kilometres from Kharapathar where Gira flows towards the north. Kupad peak is in the interior of Churdhar peak (12500 ft) and it is still indisputed that Churdhar remains clad with heavy sheet of snow for 5-6 months in the year. Sufficient to believe that this area had been part of the glaciated Himalayas. When today glaciers are receding by

kilometres in a decade, they must have shrunk by a few dozens of miles during centuries and millennia after the invent of fire. Himalayas were covered under heavy snow and the Sapadlaksha or Shivaliks were dotted with lakes throughout the area extending from Hindukush to Meghalaya and even beyond. The Gira or Sarasvati which originated from Kupad Tiba (Kupda or Kupad means a snowhite layer of a Himalayan herb, signifying heaps of white snow capping the peak of Kupad in the Kanchwa mountain range. Gira is joined by Baggi thach Nala at Gumma and by Narkanda Saraal Nala at Chhaila and a dozens of hill torrents cascading down the 12500 ft high Churdhar peak bisecting the Shivaliks and the Himalayas which still remains laden with thousands of tones of snow from September-October to May-June every year. Gira is joined by another major tributary, the Ashvini River originating from Kufri mountain range near Shimla.

In this search for the Himalayan antecedents of the Sarasvati effort has been made to look beyond Adi Badri by this writer hailing from Pauria (85000 ft asl) beyond Churdhar peak, a plutonic rock mount which remained covered with 15-20 feet of accumulated snow during winter months till about 40 years back which quantity has been considerably reduced now, this only to prove how much snows the area might have been receiving and freezing into glaciers thousands of years back. Historians and geologists must take up the task of probing the areas beyond Adi Badri for mopping up scientific corroborative evidence with a view to finding a final solution to the riddle of the missing Sarasvati

HISTORICAL BACKGROUND

All *Puranas* are unanimous that Rishi Vyasa was born as a result of love affair between Maharshi Parashar and Satyavati who used to ferry pilgrims across Yamuna on their way to Hardwar at Satighat which has been identified with Paonta Sahib (Sirmaur), Maharishi Vyasa who got the Vedas and the *Puranas* scripted down by Lord Ganesha was born without compromising with the celebacy status of Satyavati, on the bank of Yamuna River and his birth place can be identified with Kotdi Vyas which is now on the right bank of Bata river about 8 kilometres away from where river Yamuna has changed its course.

Here, it may be pertinent to mention that the present course of the river is narrower than the bed of the Bata River, i.e. the course which it used to take during the Pauranic period. Rishi Vyasa got his education under his Guru Maharshi Patanjali whose *Ashram* can be identified with Patanjali Mahadev, a Shivalingam which was situated on a Toba type ridge about 2-25 feet above the place where it has been placed now. This was done in

view of approachability of the place after consulting the local temple committee and the priests when we were preparing to construct a temple at the site. I happened to be Sub Divisional Collector of Paonta Sahib during that period. From thousand of years *Shivaratri* festival was being organized at the spot by the local population, but there was no trace of any ancient *Shivalinga* there. I encouraged excavation of the areas around and the villagers chanced upon a stone *Shivlingam* about 6-7 feet in height lying obliquely on the ridge just above the *mela* ground at village Patlien, i.e. Patanjali *Ashram*. This place is about 2 kilometres away from the present confluence of the Yamuna and the Bata, which is entered in geological records as a *nala* while the bed of Bata River is broader than that of the Yamuna. This, coupled with the local belief that Yamuna used to flow by the side of Kotri Vyas about 8 kilometres down stream from Paonta and by the side of Shivpur about 8 kilometres upstream from Paonta Sahib the place which was known as Satighat before it got christened as Paonta Sahib consequent upon His Holiness Guru Gobind Singh's visit to this place.

Both these places, i.e. Patanjali *Ashram* and Kotri Vyas, the *Ashram* of Rishi Vyasa or his birthplace are situated on the course of Yamuna taking the Bata route towards Nahan from Paonta Sahib and not the present route of the Yamuna, which takes it down to Hathnikund. This verifies that the Yamuna during Mahabharata age was flowing via Adi Badri. We found a cleavage quite wide to fit into the scheme of things near village Kolar that suggests that this could have been the confluence of Gira and Yamuna from where the Sarasvati flowed towards Adi Badri from the eastern side of Katasan Mata mandir. The Yamuna reached this place through the course of the Bata River and the Sarasvati from Jalmusa side, i.e. downhill from Dadahu Renuka. Sarasvati formed a big lake at Renuka and cascaded down from Panjhal to Jalmusa, which is almost opposite to present town of Dadahu. The term Panjhal in Sirmauri dialect as spoken in the hilly areas means waterfall which suggests that it was a sort of big waterfall throwing down the river waters at Jalmusa. At Dadahu where Renuka lake is situated on the right bank of the river Giriganga or Gira, the confluence of Gira with Jalal Nala also suggests that the bed of Jalal is wider than the bed of the river Giri when it takes eastward turn.

Now of course a dam has been constructed at the site but the old bed of river Jalal is indicative of the fact that river Gira used to follow this course in remote past or at least that the present course of the river does not match its majesty beyod the confluence or at least beyond the present Jataun dam.

The geologists are of the view that this course of the river is of a very recent origin and consequently there is lot of landslide movement along

this course causing constant problem in clearance of road between Sataun and Renuka as the road has been constructed on the right bank of the Gira River. Towards the north eastern side of the present Renuka lake there is a natural course of a brooklet, which must have been irrigating paddy fields known in Sirmauri Pahari dialect as *kiars* and this area, is known as Khalakiar village today. The paddy fields are about a kilometre higher in elevation than the present bed of the Gira or Sarasvati River. There were watermills on this brooklet traces of which are still discernible but these are much above the course of the river and of the Renuka lake and there is no plausible explanation as to why *kiars* or irrigated peddy fields should be located at a place where there is no source of water. Geologists are of the opinion that there was some river flowing through these uplifted areas in hoary past. Certainly when the Dadahu geological fault occurred, the stream which was joining Gira from the eastern side also changed its course and now meets the river at another place down below. This could be the *khala* or brooklet coming from Sataun side and joining the Sarasvati exactly at the site where we have the present Renuka lake. There are evidences on the ground that earlier the lake was also at a much higher elevation than where it stands today.

Jamu Koti the *Ashram* of Maharshi Jamdagni was probably located at the bank of the river Sarasvati or by the side of the water level of the lake, which it formed there. I climbed right up the hill up to the *Ashram* and the abode of Maharshi Jamdagni where Lord Parshurama was born and has his temple, the Palaki or palanquin of which arrives at the Renuka lake on the occasion of *Devothan Ekadashi* in the month of Kartik every year to comply with the tradition of Parshurama meeting his mother once a year ever since his departure from Renuka to Mahendra Parvat in Kerala. I also visited the temple of Lord Parshurama in Kerala where the legend of Lord Parshurama paying annual visit to his mothers place is also current, although physically no insignia of him comes to the Himalayas.

Another connecting legend is that of Lord Ganesha who sat with Maharshi Vyasa to take the latters dictation of the Hindu scriptures, the four Vedas and the eighteen *Puranas* without break. I found from the earlier records that the village of present Dadahu stood entered in State's revenue books as Ganeshpur. The fact of the town being called Dadahu is that during the Muslim regime in India when a contingent of travellers was travelling through this area they exclaimed *Deed o Hu*, i.e. what an excellent spectacle and from Dadahu got its present name. For us whether Ganeshpur or Dadahu it makes no much difference but the eastward turn of the river Gira has created a lot of confusion. If Gira is made to take the straight route from Dadahu, it joins either river Markanda or one of the small streams,

which take us to Adi Badri down which point there is no difference of opinion amongst Sarasvati researchers. This Ganeshpur is also on the bank of Gira or Sarasvati. Sarasvati takes a sharp left turn at this place whereas on the basis of rock formations in the hills it should have flown straight, but geological fault might have occurred causing yet another debacle for the Sarasvati. As historians suggest during the tenth century AD the Gira went into rage, which caused the breaking of the Renuka lake on the eastern side causing gushing floods down the present course of the river through Sataun which created floods of such great magnitude that Sirmaur Nagar which was the capital of the Chakravarti Raja of Sirmaur got completely destroyed. Legend has it that this flood, which washed away the Sirmauri Tal and the capital city of Sirmaur, was a result of curse of a *Natini* who was crossing the Tal and the river on a rope tied between village Poka to the left bank of Gira and of Sirmaur Nagar. Vyasa village was also destroyed along with Sirmaur Nagar. The curse of the *Natini* or dancing girl fell upon Sirmaur because the rope over which she was advancing from Toka side to Poka over Sirmaur Nagar where the Royal family, guests and public were watching her special feat, one of the ministers of the Raja cut off the rope because the Raja had promised to give the *Natini* half of his kingdom on successful completion of the feat. Falling down she proclaimed:

Aar poka, par toka – bich dube simouri loka

Meaning that the habitat of sirmour which is situate between poka on one side and toka on the other shall drown too in the floods.

May be an earthquake shook the area during that period which caused blockage Gira waters at Dadahu site and when the lake formed there could not withstand the pressure of the hill torrent, the eastern side of it gave way causing the Sirmaur Nagar catastrophe. This earthquake might have thrown up the ridge between Dadahu and Jalmusa blocking the waters of the river Gira or Sarasvati from that side and causing gushing floods down the newly formed course. The river then joined its earlier tributary Yamuna near Rampurghat opposite Bhagani and lost its identity too by becoming tributary of the Yamuna. Yamuna also might have changed its course only due to this tectonic upheaval, which not only saw the extinction of the mighty Sarasvati system, but also wiped out the grandeur of a mighty empire, i.e. Suryavanshi Sirmaur of its founders, the Vermans. Incidentally the name Sirmaur, literally meaning the most important one, must have been acquired by this empire after the *Ashvamedha Yajna* performed by its King Silvarman in the 3rd century circa. Sarasvati and Sirmaur Nagar, therefore lost their grandeur at the same time. The Raja of Sirmaur shifted his capital to Rajpura, then to Kalsi and finally to Nahan in due course of

time and the ruling dynasty also underwent a change. Sarasvati shifted its course from Adi Badri side to Yamuna Nagar side via Yamuna and the plains of Kurukshetra became a *tirtha* where we perform *pind dan* now without flowing waters of a river. The place known as Prithudak or Pihova in Kurukshetra gets completely dry and bereft of a drop of water during the month of Pausa or December when most Hindus make *pind dan* offerings to their ancestors apart from the *Pitri Paksha* which normally falls during September-October. Of course during the *Pitri Paksha*, the river Sarasvati can be seen at Pihova and at many other places in Haryana and Punjab. Pauranic legend says that Lord Brahma who is clamimed to have been born at Brahmayomi tirtha here, under whom Sarasvati took lessons in scriptures and music got once overwhelmed with lust and tried to attack his disciple who was an unparalleled beauty. She fled away and ran so fast that at some places she could be seen and at some other places she became invisible and that is why the river Sarasvati is visible only in patches today. Because of this unholy crime committed by the Guru Brahma, his fifth head was chopped off by Lord Shiva and to get rid of the sin of *Brahm Hatya*, Lord Shiva took bath in Pap Mochan Tirtha which also is very close to Adi Badri in Bilaspur district of Haryana and later Lord Krishna also took his ablutions there along with the Pandavas for getting rid of the sin of killing lakhs of soldiers in the Mahabharata war at Kurukshetra. This water tank at Pap Mochan is visited by lakhs of pilgrims every year to this day.

RIVER SARASVATI: GEOLOGICAL ROUTE FROM HIMALAYAN GLACIER

The Vedic Sarasvati, the mighty Sarasvati, the Sarasvati which saw the development of the most ancient civilization on the planet earth bloom into the richest treasure house of knowledge was flowing through the fields of the Thar Desert after irrigating vast tracts of fertile lands in Punjab, Haryana, Rajasthan and Gujrat of today before meeting the Arabian Sea.

The river did disappear from the map of India as if it had never flown through the present sand dunes of the Thar Desert. The rediscovery of the river could not have been possible had the modern tools not been available to the archaeologists who have struggled hard to find out the course of the river as an effort of their unflinching faith and resolute resolve. Their search brings them up to Adi Badri in the Shivalik foothills of the Sirmaur district of Himachal Pradesh where the present *Ashram* of the *Sadhus* is located at Adi Badri and the temple of Sarasvati known to the locals as Mantra mandir overlooks Adi Badri from over a huge rock. This temple is situated in the boundary of Himachal Pradesh. Tradition has it that the *Panchjanya Shankh*,

(conchshell) blown by Lord Krishna during the Mahabharata war every day before the start of the war and the close of it, is still preserved in the temple at Adi Badri. The historians and the researchers may have their limitations because they find a vertical precept ice hanging over the Adi Badri spring source leaving them clueless and helpless. But Sarasvati could not have been born there without a glacier fed system of number of rivers.

Valdiya has attempted a map of the Vedic Sarasvati based upon the premise that the river originates in Himalayan hills. It will not be out of place to mention here that during the hoary past, i.e., the Vedic age, the Himalayan glaciers must definitely have been closing below Churdhar a mountain peak which although in the Shivalik or Sapadlaksha range is rising about 3647 metres above sea level, i.e. about 12500 feet. Churdhar constitutes boundary between the present Sirmaur and Shimla districts through which the river Sarasvati flowed before entering the plains Gira, the local name of Sarasvati is nothing but a synonym of Sarasvati the goddess of *vaani*.

In local folk lore, 'Jhuri', they say

Ori au Shalve pori au Gira:Mere tau shunela qultu siya,
chanalu ri kakri da deo chira, chanalu ri kakri da na

The missing link between river Gira now known as Giriganga and river Markanda is the wide cleavage between two mountains which forms the valley of Paonta Sahib from Paonta to Kolar through which Yamuna was flowing during the Vedic period fo join Gira or Sarasvati in the south western slope of Nahan when Sarasvati was irrigating the entire Haryana and Punjab plains and was passing through the Thar Desert to drain its waters in Arabian Sea whether at Kutch or at ...

The most important *tirtha* on the bank of river Sarasvati is Pehova which gave the Hindus a guarantee of salvation of their ancestors. This place is very close to Kurukshetra, rather a part of it. The *Vaman Purana* says,

Tasmin plakṣe sthitan dṛṣṭva Mārkaṇḍeyo Mahāmunih
pranipatya tadamurdhana tushthvath Sarasvatim

It spells out connection of the Sarasvati with Rishi Markandeya who performed penances on the banks of Markandeya River which means that even during the Pauranic period Markanda and Sarasvati had separate identity though Markandeya was one of the tributaries of this mighty river.

The Indian Civilisation owes its cultural development to the Vedic period although the landmass that comprises India, Pakistan, Afghanistan and Tibet had been witness to the growth of a composite culture across the Himalayas. The pastoral tribes who inhabited this region moved up and

down in the same fashion on the Gaddis, Kinnauras and the Gujjar tribes of Himachal Pradesh do today. Their large locks of sheep and goat took them during summer season to the Himalayan hinterlands in search of cooler climate, rain free environment and above all high protein rich *neeru* grass and during winters, the flocked down towards the terrain region on the Sapadlaksha valleys which are today called the Shivalik hills and dunes. This civilization enriched itself with experiences in the Himalayan region on its southern slopes where there was enough fodder for their animal wealth and the hospitable climate was neither too hot nor too cold and because of this the named it *su-varga* or the area of the best category because neither the trans-Himalayan areas nor the Shivalik and Doon were as comfortable as the grassy slopes of the Himalayas with rich foliage, caves, herbs, forest fruits, etc. The plain doons made them uncomfortable because of the problem of visibility and consequent fear of loss of direction and then the ferocious insects and wild animals which could pounce upon the animals and human beings from any direction without adequate notice. But as they acclimatized themselves there because of better possibilities of development of dwelling clusters, they named this area as the Prithvi. Still they abhorred to transgress into the hot plains, which were full of snakes, mosquitoes and other dangerous creatures and lacked sources of water and they called this area as the Patala. Even in the recent past when the Raja of Sirmaur was getting the Paonta doon cleared of forests and asked his own countrymen, the hill folks of Sirmaur to take into possession as much of the Paonta doon plains as they could and offered them free-ownership, they declined on the pretext that the hot climate of the plains was not congenial to their health and that they were more happy with the small holdings they had in the hills of Shillai, Renuka and Pachhad. Ultimately, the Raja invited people from the Punjab to cultivate the fertile lands of Paonta and passed on the ownership of these lands to them. The scenario must have been worse during the Vedic age when the dependence for wearing apparel was on wool shorn from the sheep because cloth or silk had not been indented and living in plains without a covering was nothing but a nightmare.

The river systems provided safe passage to the flocks of sheep and goats between the snows clad mountains and the doon areas down below. The hill slopes in between the drainage system of the river Sindhu in the west and the Yamuna in the east converged to their confluence in the Shivalik foothills at Satrana nearby present Kurukshetra where they would converge from all sides along the river banks make festivities their during the climatically best period of winters in these low-lying areas and proceed upwards during Uttarayan, i.e. after the sacred bath (*snana*) on the occasion

of *Magh Sankranti*. By the time of the Pauranic age the shepherds turned agriculturists, acquired other possessions apart from the flesh on hoofs and developed their settlements in the Himalayan and later in the doons and plains, but then they needed a more regulated system to sustain their families, belongings and landed properties which made them organize themselves as Ganas and later as Rajyas. But this all is just a prelude to the top in hand. Sarasvati River was important in this scheme of things as it was central to the whole drainage system. The Ganga was not in existence till the *Ramayana* period whe Bhagirath one of the ancestors of Lord Rama brought this river to the plains of India. It acquired more importance only after the Yamuna changed its course during Bhagiratha's time because of tectonic upheavels which separated these two systems or may be even the Shatadru parted its ways with Sarasvati during the same period, but Sarasvati as a river still remained in existence. It cannot be surmised that the river Sarasvati was not in existence at Kurukshetra area when the war was fought because multitudes of warriors numbering in lakhs and lakhs converged at the sacred battlefield of Kurukshetra and remained there for at least 20 days or may be one month. Without a flowing water system of magnitude such a large force could not have survived lest the area would turn into a stinking garbage bin. Although the Sarasvati was not flowing into the Rann of Kachchh at the time of this mighty war, but it was in existence and drained itself into the Ganga-Yamuna confluence at the Prayaga. Yet another tectonic upheaval and the Sarasvati River system got further destroyed when it took left turn from Dadahu, and so did its tributaries which also took refuge in Yamuna.

The Tons or Tamsa was already meeting Yamuna which is amply evidenced by references in the *Ramayana* at Dakpathar near Kalasi. It was in position there even at the dawn of the Pauranic age as the *Puranas* describe the *Varaha avtara* of Vishnu at the confluence of Yamuna and Tamsa and the Varaha Kshetra is still in existence as an important pilgrimage centre where pilgrims take bath in seven sacred tanks situated in the Naghetadhar area of Sirmaur. I cannot, therefore agree with the thesis that Rupin rivulet which meets Tamsa River at Naitwar in Uttrakhand can be the original source of Sarasvati as Tamsa gets born as river as a result of meeting of Rupin and Shupin brooklets at Naitwar. Tamsa is known for its black waters, bankless gorges with precipitous rise and its passage through the kingdom of Pauranic Shani and Yama, the sons of Surya from Chhaya, his second wife whom Sangya, his first wife, created through black magic. Sarasvati therefore can never be identified with Tamsa originating from Naitwar area. Gira is nothing but another and more ancient name of Sarasvati whether

river or goddess. Pravara originates from Chandernahan lake in Uttrakhand and meets Tamsa which was also known as Tapti, the sister of Yamuna, about 40 kilometres down stream of Naitwar at Tiuni at the present. Its water discharge at this confluence is as big as that of the Tamsa. But in mythology the Tamsa is known as Nagakanya or river with negativity while Pravara or Pabbar is known as Devakanya or river with positivity and when such two rivers meet the name is either changed or the Devakanya gets precedence. Same thing happens to Ganga and Yamuna at Prayage where the Devkanya Ganga retains its name and Nagkanya Yamuna loses its identity in favour of Ganga. Had Pravara, therefore been meeting Tamsa in the hoary past when names were ascribed to the rivers, the decision would have gone in favour of Pravara. Therefore during Vedic or Pauranic times Pravara was not a tributary to Tamsa is a valid surmise. Pravara was either a member of the Sarasvati system or it was the mainstream from Chandernahan or sacred bath tank of the Moon God. Presently there are two streams one originating from the Kuppar peak on the boundary of Jubbal and Chopal, now in Shimla district, both were part of Sirmaur State in the past and the other one originating from Hatu peak near Baggi in Kumarsain area of Shimla district and this area also was a part of Sirmaur State till a few centuries back. Sirmaur is important because the Adi Badri area up to which scientific studies have already traced the river Sarasvati was part of Sirmaur as the State had its boundaries beyond Saharanpur in Uttar Pradesh and Shahbad Markanda in Haryana till the 16th/17th century AD. Sirmaur name was given to the kingdom of the Varman kings who were linear descendents of Lord Surya's Yama lineage, whose capital was the old *nagar* of Sirmaur near Kalsi where one of their kings Silavarman had performed *Ashvamedha yajna* (horse sacrifice ritual). The Suryavanshis used to call themselves *Ashvas* being the carriers of the chariot of the Sun god's race and when they extended their boundaries as a result of victories over ther neighbouring States, they performed the *Ashvamedha*. The Chandravanshis also used to celebrate their victories over the neighbouring kings but they did never call their *yajna* as *Ashvamedha*, but they named it as *Rajsuya yajna*. Rightly interpreted the *Ashvamedha* should mean display of *medhashakti* or superior mind power of the *Ashvas*, the descendents of Surya as Yama was. This area was known as Jaunsar or the *samrajya* of Yama or the kingdom of Yama, the younger brother of Shani and of Yamuna after which daughter of Surya the river Yamuna got its name. The Yama's branch of Suryavanshi was obliterated from Sirmaur at the close of the first century when Sirmaur Nagar near Sirmauri Tal was washed away by the Great Flood cause by the shifting of its course by Gira River or the Sarasvati.

This flood inundated the Sirmauri Tal with such a great thud that the capital city of Sirmaur which was situated on all sides of the Tal between Poka and Toka villages and might have extended up to the right bank of river Yamuna across which for reasons of safety, the *Ashvamedha yajna* was organized, the remains of which have been excavated by archaeologists in the year 1952. The notice board at this site reads as under:

> These ancient remains identified as three places out of four Asvamedha or horse sacrifices performed by Silavarman (circa 3rd AD) the burnt bricks are remains brought to light by Archaeological excavation 1952-54 (AD).

Nearby at Kalsi we also find the Kalsi Rock Edict of Ashoka the Great written in Brahmi script, which is one of the fourteenth such rock edicts, discovered so far – 12 in India and 2 in modern Pakistan. This edict is of great importance for the area because Ashoka had got inscribed all his edicts at prominent places in the country which means that the geographical and historical importance of Kalsi, the capital town of Sirmaur was recognized by Ashoka even before Christ. May be the kingdom of the successors of Yama had a glorious empire even at that time. Unfortunately we have not been able to throw much light on this empire. This might have happened because the Varmans saw truth in the curse of the *Natini* and left Sirmaur Nagar for good. Frightened by the curse, they even left the Sirmaur kingdom and fled northwards ultimately finding refuge at Bharmaur where also they invited 84 Sidhas to bless them at their new kingdom. They also got constructed temples of Lord Ganesha, Lakshna Devi, Brahmani, and of course their *kuladevta* Yama whose temple is grand in its grandeur. The Vermans later shifted to Chamba. They are known for their philanthrophy for the Brahmins and the Saints. The curse of Sirmaur fell more on river Sarasvati because the Vermans could still carve out a flourishing empire in Chamba, but the river Sarasvati is still struggling for its existential recognition.

The Chandra pillar situated at Mehrauli, according to historians has been flown down the river Yamuna from some place near Sadhaura in Haryana, which was a part of the mighty Suryavanshi empire of Sirmaur. This speaks high of the importance of Sirmaur and Sarasvati. Further research in respect of original location of this pillar and the dynasty to which it can be attributed will set things right in historical perspective because the pillar should have been erected as a landmark of victory by some emperor on the bank of Sarasvati River although it will be preposterous to put up such a claim till further research finds some testimony. The modern most city of Independent India, Chandigarh, has also come up on the bank of Vedic period flow of river Sarasvati.

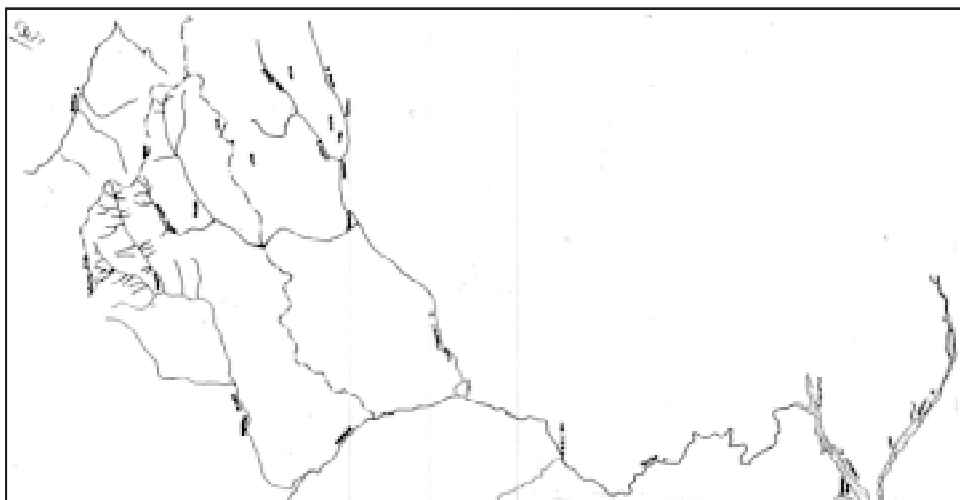
On the bank of river Markanda which could be the puranic course of Sarasvati down Dadahu, geologists have found remains of various species of animals like serigaptus, dynasaur, tall elephant and the like aat Saketi near Kala Amb which throws invitation to geologists and historians alike for further probe into these skeleton fossilized at the spot and nearby areas. We also have the fort of Maharaja Virat near Kala Amb. According to *Mahabharata*, Virat was the neighbour of the Kuruvanshis, i.e. the Kauravas and the Pandavas whose cows were stolen by men of Duryodhana and who married his daughter Uttara to Abhimanyu, the son of Arjuna. The Pandavas spent part of their exile in his kingdom and the place where they lived in cognito has been identified with Masli in Rohru area of Shimla district where a temple dedicated to the five Pandavas is also in existence. Raja Virat had his summer capital at Sunpur/Virat near Hatkoti quite close to Sarasvati Nagat about 100 kilometres from Shimla where 15 ft bronze statue of Mahishasurmardini Durga stands consecrated in a 7th century temple author of which seems to be the same artisans who created the several statues at Bharmaur in Chamba. The statue is probably the largest of its kind in recorded history of post-Guptan period. Another very important post-Guptan temple of the Devi dating back to 6th century has been located at Mangarh in Pachhad area of Sirmaur through which the Gira or Sarasvati River flows. This is the oldest living temple in Himachal Pradesh because the contemporary temples at Sirmauri Tal have been destroyed by floods of the Gira-river.

The *Vaman Purana* says that the eastward flow of Sarasvati bestows the benefits if bathing in the Ganga, southward flow of Yamuna, westward flow of Narmada and northward flow of the river Sindhu. Now, we have to locate such a river which has its flowing drain in all these directions and it the river Gira of Himachal Pradesh which has such a distinction and this fact makes its identification with Sarasvati easier. This becomes more than clear when we has a closer look at the Vedic and Pauranic course of river Gira.

This elucidated the connection between Sarasvati and Markandeya during the Pauranic period when it used to take southwestern course at Dadahu before the lake did burst towards the eastern bank causing disruption in Gira's linkage with Adi Badri. Location of Dadahu (old name Ganeshpur) on the bank of Gira or Sarasvati is also of paramount importance to the identification of Gira with Sartaswati as Sarasvati and Ganesha are both gods of wisdom. This coupled with the association of Ganesha with Maharshi Vyasa for taking dictation of the Vedas and *Puranas* also brings this whole area in focus.

Valdiya's map of Vedic Sarasvati is much closer to the present theory of identification of Gira with river Sarasvati as Gauhra diversion towards the natural course of flow of Gira took it straight to the plains of Chandigarh where Shatadru (Sutlej) met the river before Yamuna could join it somewhere in Haryana/Punjab.

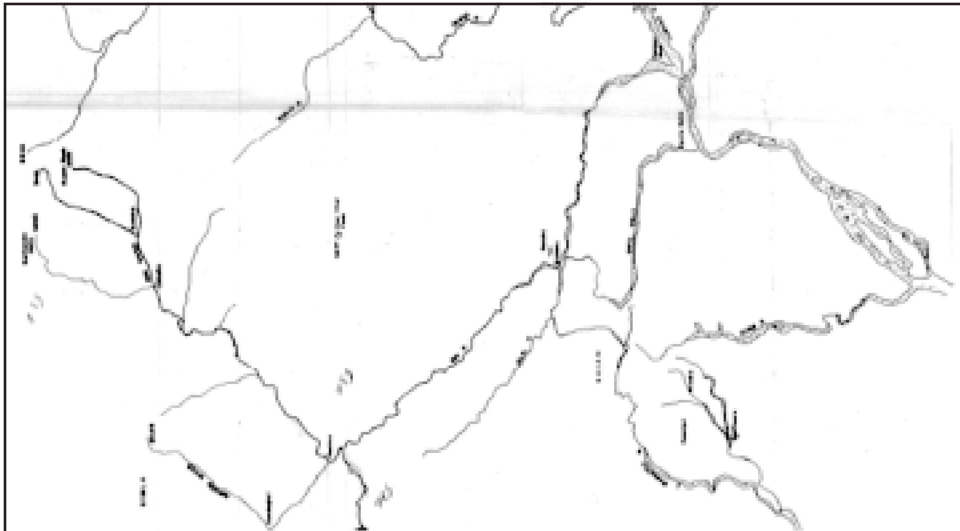
For the resurrection of the Sarasvati there is no other plausible source but the Gira River originating from Kuppar Tibba at the source of which at about 3-4 kilometres downstream from the top of the mountain where the river Gira or Sarasvati sprouts out, there is an ancient temple which is also a sacred *tirtha* where people immerse the *pushpas* or the burnt bones of their dead kins and also perform *pind dan* ritual.



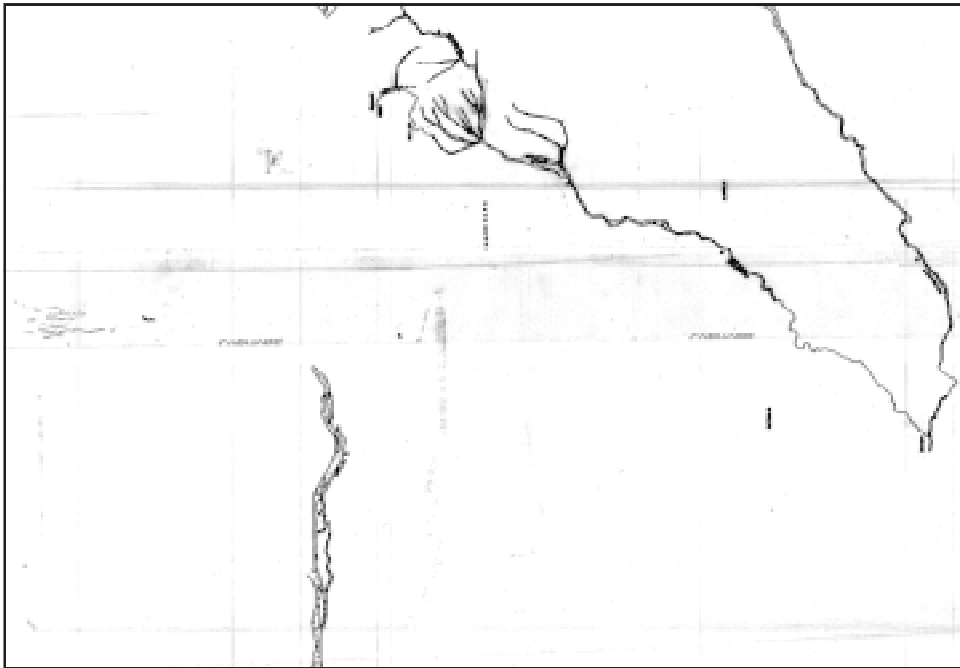
Map 1.

The Map no. 1 shows the origin of the river systems of Gira, Pabar and Tamsa. Gira, if it flowed on its natural incline westward as it does up to Gauhra, it would have met the Ghagar at Kalka or even at Kasauli which should have been the course of the river during the Vedic period. From Gauhra it takes left turn in a very abrupt manner because of geological fault, which cannot be explained, in ordinary parlance.

Again we find (Map no. 3) that the river makes an awkward entry towards the right side, i.e. the western direction at Dadahu, but then returns to the confluence and takes another abrupt turn eastward. Had it flown westward it would either have joined the Markanda near Nahan or one of the two rivulets which make a confluence at Sadhaura and join Markanda down the valley. In fact, Markanda is known to have been one of its tributories. Historians have lost track of two important tributories to of



Map 2.



Map 3.

Yamuna which used to join this river from the eastern side, i.e. on the left bank. These can probably be the Asan River which makes confluence with Yamuna near Paonta and the Somb River which now joins it from the right side. This could have been the river Drishavati of olden times that use to flow westward to join the Sarasvati but now flows eastward to meet the Yamuna.

22

A Search for Lost Cities, a Lost Civilization and a Lost River

A Letter to the Prime Minister of India

Jagmohan

APRIL 20, 2006

Dear Dr. Manmohan Singhji,

On account of your heavy pre-occupation with the Budget Session of Parliament, President Bush's visit, 'Nuclear Deal' etc., I did not think it proper to trouble you about a matter that has been agitating my mind for quite some time.

The matter pertains to a special project, which I had conceived when I was working as Culture and Tourism Minister. The project, I thought, would have enlarged the dimensions of tourism, provided new insight into the origin of our civilization, created a worldwide interest in our antiquities and attracted a number of scholars and archaeologists to study the unexplored layers of our past. Epoch-making discoveries, as they occurred at the time of excavations at Mohenjo-daro and Harappa in 1922, could not be ruled out.

But, unfortunately, the project has since been given up. Bias has prevented even attempts to understand either its true motivation or its vast potential for economic and cultural development. Through this letter, I am approaching you with the request to intervene and ensure that the project is viewed in right perspective and revived.

I give below a brief backdrop of the project, the core issues with which it dealt and the course that it intended to follow.

NAME

From the point of view of culture, the project was named as *A Search For Lost Cities, A Lost Civilisation and A Lost River*, and from the point of view of Tourism it was titled as *Travels Around Lost Cities, A Lost Civilisation and A Lost River*. The river involved in the project was Sarasvati[1] and the civilization was the one which is known as Harappan[2] /Indus-Sarasvati and the cities were those that once existed in the basin of the said river. *Loosely, this project also came to be known as Sarasvati Heritage project.*

OBJECTIVES

There were five major objectives which the project sought to achieve. The first objective was to undertake extensive excavations of the Harappan settlements in the basin of now dried-up Sarasvati, as shown in Photograph I, and build elegant archaeological museums at the sites, wherein articles of significance, found as a result of excavations, could be kept. The second objective was to set up small tourist-centres nearby, with beautiful parks and 'sound and light shows' around them. The third objective was to establish, as adjuncts to the archaeological museums, documentation-cum-multi-disciplinary[3] research units with attached pavilions, showing 5000 years' march of Indian Civilization through large panel-photographs, three dimensional models, etc. The fourth objective was to make the newly created complex attractive for residents of the neighbouring towns and villages and provide them facilities for recreation and week-end outings. And the fifth objective was to open at each of the aforesaid centres, a small window to the visitors to have a glimpse of the 'wonder that was India'.

ILLUSTRATION

By way of an illustration, I may invite attention to the case of one of the most ancient and important Harappan settlements, Dholavira,[4] where substantial work, under the aforesaid project, had been completed before I left office. The area of excavations, shown in Photograph II, has been enlarged and its special features highlighted. Photograph III provides an idea of type of the buildings that have been put up near the excavated site to serve as archaeological museum and documentation-cum-multi-disciplinary research unit. The tourist-centre has also been shown in the said photograph. Photograph IV depicts the overall conceptual plan of the complex that has been developed.

SPECIAL SIGNIFICANCE

The special significance of the project lay in the attempt to provide clear answers to some of the crucial questions concerning India's history and her culture and civilization. These questions were:

(i) Was there an Aryan invasion of or migration to India from Central Asia or Europe around 1500 BC?
(ii) What was the nature of the Harappan Civilization and how did it originate or disappear?
(iii) Were the Harappan people and Vedic people one and the same, and did they create a wholly indigenous civilization?
(iv) Did river Sarasvati exist? If it did, would it not be worthwhile to delineate its dried-up course, excavate settlements that once existed on its banks, explore their features and acquire deeper knowledge about the origin of Indian civilization?

To facilitate easy understanding, I would deal with these questions, one by one.

WAS THERE AN ARYAN INVASION?

It has been widely propagated by the Western scholars and their Indian disciples that between 1500 to 1000 BC, there was an invasion of India by light-skinned nomadic tribes, named Aryans, and it was this invasion that gave birth to the Vedic Civilization of India. The invaders destroyed the human settlements that existed earlier. After the discovery of Harappa and Mohenjo-daro, 1921-22, these settlements, which were urban in character, came to be called Harappan and the civilization associated with them the Harappan Civilization. After further excavation at Harappa in 1946, Mortimer Wheeler declared:

> Here we have a highly evolved civilization of essentially non-Aryan type, now known to have employed massive fortifications, and known also to have dominated the river-system of north-western India at a time not distant from the likely period of the earlier Aryan invasions of that region. What destroyed this firmly-settled civilization? Climatic, economic, political deterioration may have weakened it, but its ultimate extinction is more likely to have been completed by deliberate and large-scale destruction.

But this hypothesis about the Aryan invasion has really no legs to stand upon. Swami Vivekanand has rightly underlined: "There is not one word in our scripture, not one, to prove that the Aryans ever came from anywhere

outside India." Likewise, Dr. B.R.Ambedkar has pointed out: "The theory of Aryan invasion is an invention. It is a perversion of scientific investigation, it is not allowed to evolve out of facts. It falls to the ground at every point." Prof. G.F. Dales, a well-known archaeologist of Berkeley University, has also exposed the fatal flaws of this theory.

On the other hand, the equation between the Harappan Civilization and Aryan Vedic Civilization is more pronounced. The study of Colin Renfrew, a noted archaeologist at the Cambridge University, not only debunks the theory propounded by Mortimer Wheeler but also points its finger towards the similarities between the Aryan Vedic Civilization and Harappan Civilization. He has observed:

> When Wheeler speaks of 'the Aryan invasion of the Land of the Seven Rivers, the Punjab', he has no warranty at all. If one checks the dozen references in the *Ṛgveda* to the Seven Rivers, there is nothing in any of them that implies invasion....Despite Wheeler's comments, it is difficult to see what is particularly non-Aryan about the Indus Valley Civilization.

Nor can the theory of invasion/migration provide answers to a number of pertinent questions, such as these:

(a) Is it believable that the 'Aryans' who otherwise showed strong attachment to lands, mountains, rivers and forests would not carry with them the memories of any landmark of their previous homeland and nurse no nostalgia about their past?

(b) How is it that the invaders brought with them no item of previous use–pottery, utensils, tools, weapons of war and chase, objects of worship, art etc.–and also left no trace of mass killings of the natives or a large-scale destruction of fortifications or habitation which should have resulted from invasions?

(c) Is it conceivable that the people belonging to the Harappan Civilization, who had created an advanced urban society, with a developed writing system, would be without any literature, while the invaders, admittedly unlettered, would leave behind profound literary material in abundance in the form of Vedas and Upanishads etc.?

(d) Is it not clear that the Rig-Vedic expressions like 'sabha', 'samiti', 'samrat', 'rajan', 'rajaka', which indicate the existence of organised assemblies and rulers of different ranks, are relevant not to the nomadic invaders, but to the advanced urban society of the Vedic Aryans who were indigenous inhabitants of Harappan settlements.

(e) Do not the botanical studies of flora and fauna, mentioned in the *Ṛgveda*, show that such a flora and fauna could exist only in the tropical climate of north-west India and not in the cold climate of Central Asia?

(f) Have not the bones of the horse of domesticated variety been found in the recent excavation at Kalibangan, Ropar, Malvan, etc., and has not the domestic nature of Surkotada horse been confirmed by Sandon Bokonyi, an internationally renowned authority on the palaeontology of the horse.

(g) Was not the evolution of chariot more likely in the flat lands of north India rather than in the uneven terrain of the Central Asia, particularly when we have now found several examples of terracotta wheels with spokes, painted or in bas relief at sites like Rakhigarhi and Banwali?

In absence of any worthwhile answers to the above questions, the hollowness of the invasion theory stands thoroughly exposed. Equally untenable is the theory of the migration with which some scholars have tried to replace the invasion theory, having found it impossible to stick to their earlier stand. In fact, the proponents of this theory, driven by bias, have been abandoning old arguments and advancing new ones, whenever fresh evidence cropped up consequent to ongoing excavation and research.

The last nail in the coffin of invasion/migration theory has been hammered by the recent genetic studies. These studies have been conducted by the scientists in Calcutta in collaboration with the scientists of other countries. The scientists have analysed the Y-Chromo-somas of 936 men and 77 castes. They have referred to the work of the International Research Teams who have found that the earliest modern human arrived in India from Africa, trudging along the Indian Ocean coast about 60,000 years ago. In conclusion, they have said: "Our findings suggest that most modern Indians have genetic affinities to the earlier settlers and subsequent migrants and not to Central Asians or 'Aryans', as they are called."

NATURE OF HARAPPAN/SARASVATI-INDUS CIVILIZATION

When, in 1922, discovery of Harappan Civilization was made, only two major settlements–Mohenjo-daro and Harappa–had been excavated and that, too, partially. On the basis of these partial excavations, views were formulated about the origin of this advanced urban civilization. It was given out that its roots lay in Mesopotamia. Mortimer Wheeler asserted: "The idea of the city as a way of life came to India from Mesopotamia." But the subsequent identifications and excavations of more Harappan sites have

shown that these views and assertions were made without adequate evidence. No consideration was shown to a number of stark facts. Neither at Harappa nor at Mohenjo-daro, there was any sign of 'ziggurat temple' or dynasty or royal grave or any other item of monarchic rule. The lay-outs of these two cities and other features differed from those of Mesopotamia cities. The trade connections, undoubtedly, existed between the two regions during the reign of Sargon of Akkad (2380 BC), as is proved by the existence seals of Mohenjo-daro type in Ur. But the 'cultural contact situation' has to be distinguished from 'cultural origin situation'. Clearly, Mortimer Wheeler and the like failed to make this distinction and were hasty in drawing conclusions.

John Reader, a noted scholar of Anthropology and Geography, in his definitive work on cities, has shown that emergence of cities and civilization in six widely separated places around the world – Mesopotamia, India, Egypt, China, Central America and Peru – was spontaneous and none resulted from contact with one another. He has observed:

> "The earliest cities of Mesopotamia and the Indus valley civilization in India date from around 6,000 years ago. Cities appeared in Egypt slightly later. The earliest Chinese city known so far (Her-li-t'on, south of the Yellow River in central Honan province) dates from about 4,500 years ago, while those in Central and South America are a thousand years younger still. At each location the emergence of a city marked the beginnings of a distinct civilization; it was as though once a set of preconditions had been established, cities and civilization would inevitably follow".

Now, that over 2000 Harappan sites have been identified and quite a few of them excavated, we are in a better position to pronounce upon the origin and character of the Harappan Civilization.

The Harappan sites identified so far could be divided into two broad groups; one is scattered in the Indus basin and the other in Sarasvati basin. Together, they reared the Harappan Civilization. More appropriately, this civilization should have been called Indus-Sarasvati Civilization because it was really a gift of two great rivers – the Indus and the Sarasvati, just as Mesopotamian Civilization was the gift of two rivers, the Tigris and the Euphrates.

In this regard, path-breaking work has been done by Dr. Rafique Mughal, former Director-General of Archaeology, Pakistan, who has discovered about 300 Harappan sites in Sarasvati/Hakra basin in Cholistan desert of the erstwhile state of Bahawalpur. This is what Mughal has himself recorded:

> This survey of Cholistan has yielded a wealth of information on the cultural sequence in the central Indus Valley....Sites of various periods, and their concentration or distribution, provide a reliable basis for reconstructing various changes in the course of the Hakra River, often identified with the Sarasvati of the Vedic period....Archaeological evidence now available overwhelmingly affirms that the Hakra was a perennial river through all its course in Bahawalpur during the fourth millennium BC (Hakra Period) and the early third millennium BC. (Early Harappan Period).... About the end of the second, or not later than the beginning of the first millennium BC, the entire course of the Hakra seems to have dried up and a physical environment similar to that of present day in Cholistan set in. This forced the people to abandon most of the Hakra plain.

Recent excavations at Sothi, Lothal, Kalibagan, Dholavira, Banawali, Rakhigarhi, Surkotada, Kunal, etc. in India, in the basins of Sarasvati and its former tributaries; and also at Rehman Dheri, Kot Diji, Amri, Balakot, Mehrgarh, etc. in Pakistan, in the basins of the Indus, Sarasvati-Hakra and their tributaries, show that the civilization that developed in these basins was indigenous and it saw a gradual change from early phase to the mature phase. In the latter phase, commerce and trade developed as is evident from the discovery of weights, measures, seals, etc. and also of dockyard at Lothal.

The evolutionary trends can also be discerned at other sites. In Dholavira, for example, excavations have revealed, besides unique items, such as polished stone pillars and large ten-letter inscription of Indus script, seven distinct stages of development, covering pre-Mature Harappan, Mature Harappan and post-Mature Harappan periods. The indigenous nature of the civilization and continuity of its development is also proved by Kot Diji's excavations which show that the people in this fortified settlement were living in structures of stones and mud bricks for about 500 years before the Harappan period. The evidence of the formative period of the Harappan/Indus-Sarasvati Civilization is also available from the excavations at Balakot, Jalilpur Amri , Kalibangan, Banawali, Rakhigarhi, etc.

The excavation done by the French team, headed by Jean-Francois Jarrige, during the last 15 years or so, at Mehrgarh, Pakistan, are particularly significant. They have pin-pointed the beginning of civilization in India and shown that Indus-Sarasvati Civilization had no moorings in Mesopotamia or any civilization outside India. They have revealed the existence of farming communities dating back to 7000 BC.

> "The horse and other animals, particularly cattle, were domesticated here from 6500 BC onwards. By 6000 BC, the settlement had a veritable

agriculture economy solidly established. Thereafter, there was a continuous sequence of cultures, spanning 4000 years, leading to mature urban civilization".

This shows in no uncertain terms that the process of evolution was steady and development of culture was marked by continuity.

The conclusions of Jarrige are categorical:

> "No element suggests the influence of technologically more advanced group on the first Neolithic population of Mehrgarh, neither in the craft sphere nor in agriculture....There has been a homogenous material change across the region, indigenously generated by a local process of neolithisation."

It has been rightly observed: "The people in Mehrgarh tradition are the people of India today." There are marked similarities between the social and religious practices of the Harappan people and the people of the present-day India. For example, the spiralled bangles of the type found around the figurine of the Harappan dancing girl could still be seen on the arms of women in Haryana, Rajasthan, Gujarat, etc. Again, as was the case with Harappan women, 'sindoor' is even now applied to the medial parting line of the hairs by married women of orthodox Hindu families. The Mohenjo-daro seal, depicting a seated human figure in yogic posture, with a number of animals around, shows that the cult of Shaivism, which has a large following in modern India, originated in Harappan period. Likewise, the fire-rituals of that period are a forerunner to the present-day practice of performing *havan* in Hindu houses. Some other common features of the two periods are: the practice of worshipping trees, putting of *Svastika* symbol at the entrance of the houses; and the ways of greeting and doing 'asans'.

It needs to be noted that when John Marshall and Mortimer Wheeler excavated these settlements, they could not go, owing to the existence of sub-soil waters, beyond the first level or two. With the deployment of pipe digging technology, the archaeologists who came to the scene at a later stage, could explore the lower levels, up to the bedrocks. They found that the growth of culture at the sites was linked by a continuous chain. There was an early phase followed by a maturer phase, from proto-urban to urban. What John Marshall and Mortimer Wheeler came in contact with was the later mature phase. Nevertheless, John Marshall got glimpses of evidence which led him to observe:

> "The [Harappan] religion is so characteristically Indian as hardly to distinguish from still living Hinduism. One thing that stands out both at Mohenjo-daro and Harappa is that the civilization hitherto revealed at

these two places is not an incipient civilization, but one already an age-old stereotyped on Indian soil, with many millennia of human endeavour behind it."

DID SARASVATI EXIST?

There is ample evidence that supports the view that river Sarasvati once existed. This evidence could be divided into four distinct categories–literary, archaeological, geological and hydrological. Each category needs to be looked into first separately and then in conjunction with one another.

(I) Literary

The *Ṛgveda* mentions Sarasvati, in reverential tone, about 50 times. It describes it as "the best mother, the best river, the best goddess". The famous Nadi-stuti hymn mentions a set of rivers, including Ganga, Yamuna, Sarasvati and Sutudori (Sutlej), and places Sarasvati between Yumna and Sutlej. Its origin is indicated in the hymn which says: "Purest among all rivers and vibrant, the Sarasvati moves on from the mountains to the ocean, manifesting immense riches of the world...." Another hymn indicates the might of Sarasvati: "This river has shattered the mountain peaks with her fast and powerful waves just as easily as one uproots the lotus-stems...." She is also called the seventh 'Indus Mother'.

The *Manu samhita,* one of the most ancient law books of the Hindus, also makes it clear that the Vedic culture originated in the Sarasvati region and centred around the river. It say: "The land created by the gods, which lies between the divine rivers Sarasvati and Drishadvati, the sages call the land of Brahamanas." The *Ṛgveda* provides the corroborative evidence in the verse which reads: "O Agni, I have established you at the best place on the earth, in the dwelling of Ila, on this most auspicious of the days; may you shine brilliantly amongst the descendants of Manu, on the banks of the Drishadvati, Apaya and Sarasvati."

Another hymn implores Sarasvati to keep the misfortunes at bay: "When, on your banks, full of plants, the peoples dwell, luminous Sarasvati, may you awaken as our protectress."

The ancient literature speaks of Sarasvati not only when it was in glory but also when it began to decline. The *Mahabharata, Aitareya* and the *Satapatha Brahamana* refer to its disappearance in desert.

(II) Archaeological

As early as 1872, C.F. Oldham and R.D. Oldham undertook a detailed survey of the area where the river Sarasvati and its tributaries were said to be

flowing in earlier times. As a result of this survey, they located the course of Sarasvati and its tributaries. They came to the conclusion that Sarasvati was once fed by two great rivers–Satluj and Yumana–and it declined and disappeared consequent to westward movement of the former and eastward movement of the latter.

In 1940-41, Aurel Stein, explored a part of the dried-up course of Sarasvati in the erstwhile State of Bahawalpur, where it is known by the name of Hakra. He identified as many as 90 Harappan sites. In 1969, Herbert Wilhelmy, a reputed German geologist, surveyed the relevant areas and put forward the view that, consequent to geological changes, Yamuna changed course and took away the entire water of Sarasvati.

Subsequent explorations both in India and Pakistan, in the Indus and Sarasvati basins, led to, as indicated above in the section dealing with nature of Harappan/Indus-Sarasvati Civilization, the identification of over 2000 sites. The number of sites identified in the Sarasvati basin is about seven times more than the number identified in Indus basin, thereby implying that Sarasvati basin had a larger share in shaping this civilization. The total area covered by it was about 2.5 million sq.km. Roughly it extended to Ropar in the north; Dainabad on river Godavari in the south, Alamgirpur on river Hindon, near Delhi in the east; and Sutkagendor and Mirikalat on the Arabian sea in the west.

(III) Geological

A group of scientists, led by V.M.K. Puri and B.C. Verma, have made a detailed study of the areas from which river Sarasvati could have possibly originated. They collected and analysed a lot of scientific data–geomorphological, glaciological, etc. They have significantly observed:

> All evidence point to only one conclusion that the present day Tons was in fact the Vedic Sarasvati in its upper reaches. This river was in existence during upper Pleistocene period as it was fed by glaciers that had descended to much lower limits in Garhwal Himalaya than the present day level due to the influence of Pleistocene Ice Age.

REFERRING TO THE COURSE OF SARASVATI, THESE SCIENTISTS ADDED

From Adi Badri region, the Palaeo-Sarasvati took the south-westerly course and reached Kurukshetra. From here it turned to slightly westerly direction and met the monsoon-fed Ghaggar which emerged from the hills near Shimla. Around 25 km south of Patiala, the Tibetan glacier fed perennial river Satluj, joined this course of the Sarasvati and made it the mightier of

the mightiest river with enormous quantity of water flowing through a very wide channel. It was certainly the case from 4000 BC through 2000 BC.

What made Sarasvati once a great river was its origin in Himalayan glaciers, and when it was joined by the river Sutlej from the north-west it became wider and more powerful, capable of 'shattering mountain peaks' and destroying big trees. Archaeological data and radio-carbon dates show that due to seismic upheavals in the region, both the Sutlej and Yamuna got delinked from Sarasvati. This, coupled with other changes mainly hydrological and environmental, resulted in the drying up[5] of the river by about 1900 BC.

A team of three scientists of the Central Arid Zone Research Institute, Jodhpur, an outfit of the Indian Council of Agriculture Research, carried out an extensive survey of the relevant area, using LANDSAT Imagery. In its report, the team said:

> A major abandoned course of Sarasvati river has been discovered through the present extreme desert terrain of Jaisalmer....We suggest that the alluvium in the extreme western part of the desert was contributed by the Sarasvati River, and that the sub-surface water in the western part of the desert is mainly derived from precipitation flowing sub-terraneously through the former course of Sarasvati.

Here, it may not be out of place to indicate that many other areas of the world have undergone similar ecological changes. For example, Fezzan region in South-western Libya, which was once littered with lakes and rivers, became a desert. David Mattingly, an archaeologist, and Kevin White, a geographer, have in their joint work shown that water exists even now in the subterranean acquifer. Presently, Fezzan supports a population of about 80,000 which is settled in a number of oases that depend upon water from beneath the sand. From the same source, Tripoli also gets about a million cubic metres of water daily through a network of underground pipes. Why could we in India not explore the former course of Sarasvati and assess the availability of water in the subterranean acquifer.

HYDROLOGICAL

Using the technique of Remote Sensing, four eminent scientists–Yashpal, Baldev Sahai, R.K. Sood and D.P. Aggarwal–also conducted research on the subject. In their joint article, they wrote:

> The river Sarasvati is said to have been a mightier river than even the Indus in the Vedic and Pre-Vedic times. Stein refers to the fact that in at least three passages in the Ṛgveda, the oldest surviving record in any

> Indo-European language, a river course has been mentioned which corresponds to the present Sarsuti (Sarasvati) and Ghaggar. Nadistuti, the famous hymn, describes the Sarasvati as flowing between the Yamuna in the east and Satodri (Satluj) in the west. Since none of the present rivers obviously fits in with this description, the appellation 'lost' Sarasvati has often been applied to this once mighty historical river....During the period 4-5 millennia BC, north-western Rajasthan was a much greener place with the Sarasvati flowing through it. Some of the present rivers joined to make Sarasvati a mighty river which probably discharge into the sea (Rann of Kutch) through the Nara, without joining the Indus.

After Pokharan Nuclear explosion on May 11, 1998, the Bhabha Atomic Research Centre conducted a number of tests to assess the impact of the explosion on the quality of water in the area around. These tests, *inter alia*, revealed that the water in the area was potable and about 8000 to 14000 years old. It came from the Himalayan glaciers and was being slowly recharged through acquifers from somewhere in the north, despite scanty rainfall. These revelations lend further support to the above views about the 'lost' Sarasvati.

Separately, as a part of multi-disciplinary study, the Central Ground Water Commission dug a number of wells on and along the dry bed. Out of 24 wells dug, 23 yielded potable water.

In face of the above cited literary, archaeological, geological and hydrological evidence, only a scholar with compulsive bias would say that Sarasvati River is a figment of imagination or identify it with a small and locked river, Helmand in Afghanistan, where there is no question of any

RIVER FLOWING FROM MOUNTAIN TO SEA

Overall Picture

If all that I have said above in connection with the basic issues concerning the origin and nature of Indian Civilization and its association with river Sarasvati, is viewed in entirety and subjected to an integrated look, the picture that would emerge is that the period, 6500 to 3100 BC, saw the growth of pre-Harappan/Indus-Sarasvati Civilization, corresponding broadly to the times when *Ṛgveda* was composed; that during the period, 3100 to 1900 BC, Mature Harappan/Indus-Sarasvati Civilization prevailed and these were the times when the hymns of four Vedas were composed; and that the period from 1900 to 1000 BC was the period of Late Harappan/Indus-Sarasvati Civilization which saw the decline and ultimate disappearance of the surface

water of the Sarasvati, forcing the people to move eastward towards the water-fed Gangetic plain and work out new subsistence strategies and develop new modes of agricultural pursuits, giving rise to a new pattern of life which we find reflected in the *Mahabharatta* and Puranic literature.

While the puzzles of archaeology and ancient Indian history cannot be resolved with certainty, particularly with regard to Harappa, wherein script has not so far been deciphered, it could be stated with a fair degree of accuracy that the Harappan/Indus-Sarasvati Civilization was born and brought up on the soil of India and its people and Vedic people were one and the same. This civilization started disappearing when the rivers-system underwent a fundamental change consequent to sedimentation and neo-tectonic movements whose signatures are wide-spread in the geological formations of the sub-Himalayan and Shiwalik regions of Himachal Pradesh, Uttar Pradesh, Uttaranchal and Haryana. The waters of Sutlej shifted to the Indus system and Yamuna changed its course to north-east. While Sarasvati practically dried up, Indus basin got additional water and saw frequent floods.

Pramount Need

Nevertheless, a lot of additional work needs to be done to unravel a number of features of one of the most significant civilizations of the ancient world– a civilization that remained for centuries a nursery of a highly sophisticated urban culture. Hundreds of sites in the basin of now sub-merged Sarasvati, from Adi-Badri in Haryana to Dholavira in Gujarat, as shown in Photograph I, need to be excavated. *It was this paramount need which the special project intended, inter alia, to meet. To believe that there was a hidden agenda is wholly unwarranted. How could there be any such agenda when excavations were to be carried out in open and whatever was to be found was to be placed in the site-museum with complementary facilities for research and study of documents by all?*

In view of the considerations spelt out in this letter and also the huge benefits that would have accrued to Tourism sector, I would request that you may issue suitable instructions to all concerned to recommence the special project and spread its net still further. I have no doubt that the project, if implemented, in the spirit it was conceived, *would show new facets of India's past, new initiatives of her present and new visions for her future.*

NOTES AND REFERENCES

1. Over the years, the dried-up bed of the Sarasvati has been given different names in different regions. In a few districts of Haryana it is still called Sarasvati; in others, its palaeo-channel is known by local names Joia Nadi,

Ranggoi, Bann, Nali or as Ghaggar–a name that is retained in northern Rajasthan. Near Suratgarh, it is identified with its tributary, Drishadvati. In Cholistan, Pakistan, it is named Hakra.

2. Harappa was one of the two prominent sites to be discovered first. Therefore, the settlement/civilization that came to be associated with was called Harappan. Since sites of this genre, excavated subsequently, were either in the basin of Indus or in the basin of Sarasvati, the expression Harappan settlement/civilization is now being increasingly substituted by Indus-Sarasvati settlement/civilization.
3. The multi-disciplinary research included metallurgical, mineralogical, botanical, geological and sedimentological studies.
4. The other such sites, along the Sarasvati route from Adi-Badri in Harayana to Dholavira in Gujarat, where work had been taken in hand, were: Adi-Badri, Kapalmochan, Kurukshetra-Thanesar, Banawali, Sirsa, Agroha, Kalayat-Kaithal, Rakhigarhi, Hanumangarh, Rangmahal-Badopal, Kalibangan, Baror, Dhola Vira, Juni Kuran and Narayan Sarovar.
5. There is an alternative view, propounded by Dr. M.K. Dhavalikar and Dr. R.S. Bisht, which says that river Sarasvati was a river of lakes and it dried up due to general aridity that occurred all over the world between 2000 and 1800 BC.

23

Sindhu-Sarasvati Traditions, Still Living with Us?

Adiga S. Sundara

I. In the middle 1960s, my field explorations in the upper Krishna Valley (Belgaum district) had resulted in the discovery of numerous, extensive habitation sites generally with immense material remains of protohistoric Chalcolithic culture, about 22, as e.g. Terdal, Kudachi, Satti, etc. located in the most fertile black cotton open fields under cultivation. I was told by local people that there were earthen mounds ashy in nature in most of those sites. But now they are all almost reduced to the ground level since people had been digging them for sticky and ashy earth for domestic purposes over years.

Subsequently one of my Ph.D. students, H.S. Kambley, explored this tract of land and identified a few more Chalcolithic sites of similar nature. One of them is Mangsuli. He was told by the local people that in the course of their ploughing the land, some bricks probably of a structure, were found. Kambley had a trial pit in it. Interestingly enough a thick circular lime floor of a house was also traced besides material remains of usual kinds such as pottery, etc.

In some of the sites are found scattered lumps of scoriaceous ash or remnant of an ash mound, also scoriaceous. Such ash mounds are found in the Krishna-Tungabhadra *doab* in many numbers since the time of Robert Bruce Foote in 1870s. In addition, the Savalda pottery with black paintings on the bright red surface of distinct types, in considerable quantity almost invariably is found. In addition to this there occurs for the first time Savalda pottery of grey ware fabric which as for as I know is not found in the other sites elsewhere. There is yet one more unusual feature in this pottery: simple straight lines in the sets, parallel or oblique, in brown or ivory black or dull

white. It may be noted here that the pottery of the Savalda kind and tradition red or grey, are known for the first time from these sites only in south India. Of course, in these sites the Neolithic grey ware pottery, often burnished and micaceous, plain and painted, is the most common along with microliths, parallel sided blades, semi fossilised animal bones, stone beads, etc. The material remains of these sorts are common in the habitation sites of the Neolithic culture in the Chalcolithic stage with remnants of ash mound in the middle and the lower Krishna particularly in the Krishna-Tungabhadra *doab.* But in none of these sites are found Savalda pottery.

II. Occasionally, in a very few sites are found bi-chrome painted pottery as at Terdal. The paintings are geometrical comprising designs in red with thin black lines bordering it. Potteries of this kind are found in small number in a few of the Harappan sites as at Mohenjo-daro, Birdhana, etc. and Bronze Age sites of Afgho-Baluchistan area. It is noteworthy in this context that the site at Birdhana is recently excavated that has revealed a cultural stage preceding the early Harappan, namely the Hakra phase, the earliest dated to circa 6000 BCE. And it is in this stage the bi-chrome pottery is found in considerable number. Now coming back to the Krishna Valley in no other sites from the Krishna to Kaveri excepting the upper Krishna bi-chrome pottery has been found so far.

III. Later, in my explorations in Naviltirth irrigational dam area (Saundatti talaka, Belgaum district) of rocky wasteland on the right bank of the river Malaprabha, is by chance found a thick flattish boulder with rounded edges and semicircular top naturally set up in the ground about 1 m high, 60 cm broad and 30 cm thick with curious engravings and hollow cup marks on one side. The engraving is a geometrical design comprising two independent endless three loop designs inserted into each other in the opposite direction. Consequently, it looks as though the engraving is an endless six loop design with semicircular top and bottom containing three loops each at the top and bottom. In between the lines are cup marks of slightly varying sizes and depth. Within a short distance from this near the riverside are sparsely found scattered on the surface apparently megalithic black and red ware and red ware potsherds. Some two kilometres away from here in Sindhogi near the bank of the river is found a megalithic burial site with passage chamber tombs in various states of dilapidation noticed by R.V. Joshi in the late 1940s.

IV. In the upper Tungabhadra Valley, are many ancient sites with material remains of the cultures: the Neolithic in the Chalcolithic stage, the Iron Age Megalithic and the Early Historical, infrequently the mediaeval (for instance Halluru) and the megalithic burial sites nearby here and there. Excavations of the burials at Komaranahalli and Tadakanahalli, not far away

from Halluru and of the habitation site at the last overwhelmingly demonstrated that the Iron Age Megalithic culture is distinctly characterised with white painted black and red ware pottery.

In Anegondi Gangavati area (near Hampi), as is well known, are many sites with cave paintings a few of which containing some unusual geometrical designs as at Chikka Ramapura and Hire-Benkal of the overlapping late Neolithic in the Chalcolithic and the early Iron Age Megalithic. The designs, rather sophisticated are two squares with loops at the corners each obliquely intersecting the other. A design of this type, but in single line, plain and simple, is found engraved occasionally on Harappan seals. In Venkatapura in one of the cave paintings are small designs looking like Harappan (Sindhu-Sarasvati) letters.

Now by way of review of the facts enumerated in some detail above, particularly noteworthy are the occasional occurrences of certain indubious Harappan cultural elements and of the white painted black and red ware pottery of the Harappan tradition. It is therefore necessary to elaborate the scope, the route, the period and the significance of the presence of these cultural items of importance in the upper Krishna Valley and further south. This is what has been attempted below.

> The Savalda pottery was traced for the first time in the Tapi Valley at Savalda in late 1950s and later in many other sites in the same valley all by S. A. Sali. This distinct pottery therefore is named after the first type site. In 1959 was discovered by the Aurangabad circle, Archaeological Survey of India (ASI), an enormously extensive Chalcolithic site highly promising in Daimabad (Ahmednagar district, Maharashtra) located on the bank of the river of Pravara, a tributary to the river Godavari. Immediately after the discovery, the site was excavated under the direction of Sri M.N. Deshpande, in which I participated. A sequence of three successive cultures, namely, the Deccan Neolithic, the Malwa and the Jorwe without any gap in between, was established. In the late 1960s, Aurangabad circle of the ASI, under the direction of S.R. Rao, and slightly later of S.A. Sali, continued the excavations. This time a sequence of five successive Chalcolithic cultures was revealed. They are from the earliest (i.e. the lowest) the Savalda, the late Harappan, the Daimabad, the Malwa and the Jorwe. Besides, sometime after 1959 was discovered in the same site accidentally by the local people while digging a pit a cache of solid copper figures of buffalo, elephant, a man in a cart drawn by bulls and a rhinoceros. Two important discoveries therefore in the site are: the late Harappan as far south as the Godavari Valley and the copper figurines distinctly and closely similar in form, style and characteristics to the corresponding Harappan figures. Secondly, the discovery of the Savalda cultural phase is essentially noteworthy in the present context: the large extent of the Savalda culture from the Tapi to the upper Krishna via the Godavari is thus vindicated.

At Mohenjo-daro, many copper tablets, flat, rectangular and thin, with pictures on one side and in some, Harappan inscription on the other, it is too well known, were obtained from the excavations. Among these tablets, two have geometrical design of the same type, instead of pictures on one side and one line Harappan inscription on the other. The design is an endless four-knot. When this design is compared with the six-knot design from Naviltirth referred to above, it can be deduced that the latter is a variety of the former type. The four-knot design, by way of tradition, continues to be depicted through the historical period, the design may be engraved on individual rough stone slabs set up in front or on some architectural part of the temple or on stone slabs fixed at the entrance of a locality so on and so forth. For instance, two slabs set up apart in front of a Hanuman temple of the Keladi period (circa 1490-1763 CE.) in Holaluru near Shivamogga; the bottom side of the front beam of the *sabha mandapa* of the Nandi temple also of the Keladi period in Halenagara, with the design engraved or carved in low relief etc are but a few examples.

Evidently, all these abundantly indicate that the design is auspicious. By way of corroboration, in Gudnapur, at the periphery of the excavated early Kadamba palace site with Ravi Varma's, the early Kadamba king, pillar inscription, is an isolated boulder on which are a few geometrical designs with the Kannada alphabet, 'u' of the late mediaeval period. One of them is a four-knot design flanked by the designs of *sankha* and *chakra.* It may be recalled here that in the Vaishnava temples of the Vijayanagara period, in the *lalata bimba* depicted *sankha*, *tiru* (= sacred) *nama* (= mark) and *chakra* a symbol of Vishnu in the form of Venkatesha. Elsewhere, I have tried to demonstrate how *Sri vatsa* might have been evolved from the four-knot design of the Harappan design (of course, this was earlier hinted by Sivarama Murti) and the even *Devanagari Sri* from it. Obviously therefore, the design is conspicuously of religious significance and therefore auspicious. It may not be wrong if the Harappan design also is relatively presumed to be of religious significance and a genetic relationship between the two, may not be ruled out.

In some of the Harappan seals as mentioned above, are the engravings of two rectangles with loops at the corners obliquely intersecting with each other. In the rock shelter paintings at Hire-Benkal and at Chikka Rampura, are intimately similar designs but in double lines. Furthermore, there are two other sites: Gavali near Kundapura (Udupi district) and Sonda (Sirsi taluka, Uttara Kannada district) with strongly similar rock engravings stylistically of the overlapping Neolithic in the Chalcolithic and the Iron Age Megalithic, i.e. circa 1000 BCE. In the former the design comprises of two bulls facing each other and the *mandala* of the Chikka Rampura type is

depicted as attached to the legs of the bull on the right as if to indicate that it is standing on the *mandala.* And the horns of this bull are decoratively tied with flowing strips apparently of cloth. Obviously, the whole picture displays some religious ceremony in which the bulls are evidently worshipped. Of course there is a ritual known as *Vrishotsarga* connected with the ancestor worship and also to be performed for the prosperity and well-being of the society. It is interesting to note that not far away from the site of the engravings in Gavali is Kakkunje with an Iron Age Megalithic burial site with porthole Chambers. In Sonda, on a stone boulder is the depiction of two rows of three bulls each one behind the other but of varying proportion. Here also *mandala* of the type under discussion is added to the legs of the bulls of one row and a *mandala* of different type that is endless six-knot design different from the Naviltirth type attached to the legs of the bulls of the other row. Thus in the site are two *mandalas of* different types. Thus there appears to be *mandalas* of various types of ritualistic significance even in the protohistoric cultural stage. In the historical period *mandalas* increasingly of various types are drawn on the floor in connection with rituals of different kinds. And this practice continues till today. For instance, actually on the occasions of *upanayanam*, *vivaha*, *shantis* of Vedic tradition while performing *Naandi* even now the obliquely intersecting double squares with loops at the corner, is drawn and worshipped.

Another important feature to be noted with regard to the Chalcolithic sites in the upper Krishna Valley, is the occurrence of black on red painted pottery in considerable quantities. In particular at Terdal (Belgaum district), are found bi-chrome potteries which paintings in red and white. The designe comprise black lines on the border and red filling. This tradition was prevalent in some of the Harappan sites especially at recently excavated Birdhana (Fatehbad district, Haryana) and in a few sites with the Bronze Age cultural remains and at Mohenjo-daro, etc. This is a tradition distinct of the Chalcolithic cultures of the Sindhu-Sarasvati Civilization, though not very common. Further, In a few of the sites of the upper Krishna Valley are found painted pottery in large quantities as e.g. at Terdal, but few and far between in the sites of the middle and lower Krishna Valley probably owing to the impact of the civilization infiltrating as far south as the Godavari Valley.

How do these distinct symbols of the Sindhu-Sarasvati Civilization find their way in the late stage into the western part of the lower Deccan? especially Karnataka? Did they originate independently without any extraneous cultural impact in different regions at different times? This does not seem to be the case. The designs are not simple and of utilitarian character. They are rather of specialised concepts. As known up to now

such designs are found in the Sindhu-Sarasvati cultural domain and in the rock art of the late Neolithic in the Chalcolithic and the the Iron Age Megalithic cultures of the lower western Deccan and the Sahyadri ghat-coastal region. As discussed by me elsewhere the complicated six-knot design created with two endless three-knot designs from Naviltirth belongs to the Iron Age Megalithic cultural stage. On the other hand the obliquely intersecting double squares with the loops at the corners found in the rock painting in Chikka Ramapura is obviously of the overlapping phase of the Neolithic-Chalcolithic and the Iron Age Megalithic. That is to say these designs of the places are more or less contemporaneous. Are there therefore any evidences to establish a relationship between this cultural phase with the Harappan?

In Gujarat region, one of the pottery fabrics of the Sindhu-Sarasvati culture is white painted black and red ware pottery. A distinctive cultural phase predominantly containing this pottery is unambiguously identified at Lothal known for its dockyard the world over. This pottery is found along with the late Harappan and other regional pottery fabrics in many of the sites in the Tapi Valley; in a Chalcolithic burial of the Jorwe period (circa 1500-1200 BCE at Tekwada opposite to Bahal ancient site having the remains of the of the Jorwe Chalcolithic, the Mauryan, the early historical and the late mediaeval on the bank of the Girna River, a tributary to the Tapi: in the upper Godavari Valley as at Inamgaon; Theur, near Pune and the upper Bhima as at Chandoli and in the Krishna - Tungabhadra *doab* at Tekkalakota, all in more or less Chalcolithic context. Tekkalakota is only hundred plus kilometres to the north-east of Halluru. In Tadakanahalli, Komaranahalli and nearby Halluru of the upper Tungabhadra known for the white painted black and red ware pottery in plenty. In fact this pottery as the dominant ware of the culture, is found in the Iron Age Megalithic culture datable to circa 1300-1000 BCE on average. Elsewhere I have made a detailed study of this pottery from Halluru region in comparison with the corresponding pottery from the Sindhu-Sarasvati culture in Gujarat and the Banas copper age culture in Rajasthan. The pottery from the former is intimately more akin to that from Gujarat region, in types and fabrics.

All these unmistakably indicate cultural movements with their traditions from the Sindhu-Sarasvati cultural area of the Gujarat region towards the upper Krishna and the Tungabhadra. This must have taken place in the wake of the decline of the urban economy of the Sindhu-Sarasvati into the rural from around 1700 BCE. This was the period when the river Sarasvati had almost dried up owing to the geological upheaval. Consequently, the user of white painted black and red ware pottery from the Harappan region moved southwards in search of fertile land and

resources necessary for their livelihood, crafts and prosperity. The sites having the pottery in question now known in the region between the Gujarat and the north Karnataka of the upper Krishna Valley substantially indicate the route followed by them. The route does not seem to be new for the people of the Sindhu-Sarasvati zone. For, already in the late Harappan context the people had been moving through the Tapi and as far south as the Godavari. For, in Daimabad of the Godavari Valley there is a clear-cut late Harappan cultural phase datable to 2000-1800 BCE. Besides, the authors of the Savalda pottery culture had also been moving either way from Tapi to Krishna preceding the late Harappans. Thus the route from Gujarat to the western Karnataka of the upper Krishna Valley had been a familiar track intimately very well known over centuries for the contemporary peoples of two successive cultures different from one another, namely, the Savalda and the late Harappan. The users of the white painted black and red ware pottery could easily follow this route known very well since long. These movements therefore overwhelmingly imply the diffusion and the survival of the traditions of these communities even in the upper Krishna Valley. Of the many traditions that may have survived undergoing modifications, only a few are now known in the field explorations. There may be a few more that are yet to be identified.

Furthermore, the diffusion and the survival of some of these traditions could be traced further southwards. The white painted black and red ware pottery is found at Benakanhalli (Honnali tk. Davanagere district), Heggadehalli (Kodagu district) both in Karnataka, and at a site (North, Kerala). Similarly the endless four-knot design as mentioned above is found at the entrance of the villages in Hirekoppa, Somenakoppa (Hirekerur-Sagara area) near Hallur; in a temple each in Holaluru and Halenagara; on a boulder in Gudnapur; on the *adhishthana* of the Amriteshvara temple of the Hoysala period in Amritapura (Tarikere taluka, Chik-mangaluru district) all of the Sahyadri region and at Gavali of the adjoining coastal belt. During my explorations in the latter part of May, '08, in the Virajpet area, Kodagu district, in a megalithic site with menhirs, there is a roughly dressed granite pillar like slab on which is an engraving of the endless four-knot design.

In the adjacent Tamilnad district, the white painted pottery black and red ware pottery is found at Perumbair, T. Kallupatti and at Adichannalur. Especially in the last site the pottery is in abundance. I have examined the pottery form these sites excepting Perumbair. The pottery in types and fabrics are closely analogous to the pottery from Halluru. There appears to be some worth mentioning geographical coincidence in the distribution pattern of the white painted black red ware pottery and the endless four-knot design. If there is any cultural relationship between the two, then the

users of the former are the carriers of the latter tradition from the Harappan region in course of time to the south during the Chalcolithic-Iron Age Megalithic cultural stages. However, in Tamilnad so far, the geometrical designs of the types under discussion have not been reported. There is therefore a need to trace them out if there be any in the region.

By way of corroboration, there is one more point of cultural significance to be noted. The white painted black and red ware pottery generally has graffiti marks from the Harappan times to the Iron Age Megalithic. It becomes the most significant in brief to recall that in the preceding Neolithic and Neolithic in the Chalcolithic stage cultural context in the Deccan and south India, no graffiti marks are found on the pottery. However, post-firing and graffiti of Harappan letters on the pottery is found in Daimabad. There is therefore no other go but to say that it is the white painted black and red ware pottery people carrying the tradition of making post-firing graffiti on the pottery. In view of all these it would not be surprising to find a Neolithic tool with a line of writing on it that is argued to be a Harappan inscription by eminent experts, in Shambiyan Kandiyur. The excavations by the Department of Archaeology and Museums that followed the discovery in the site has revealed the earliest of cultural stages as the Iron Age Megalithic. Probably therefore the Neolithic tool with the inscription found on the surface is a survival from the preceding Neolithic culture nearby that is yet to be traced. Now the excavated pottery of the culture is under study.

It may also be noted that there are a few more instances of the Harappan cultural symbols surviving through the ages as, e.g. the *swastika* found on many of the Harappan seals an auspicious symbol that is continued to be used in the religious traditions of the Buddhist, the Jaina, the Shaiva and the Vaishnava through the ages and even today. In the recent excavations at Rakhi garhi, on the exterior surface of a potsherd from the early Harappan horizon is a large plus sign with the trident tips. This is a very common symbol associated with *yantras* of the historical times.

Certain other Harappan traditions relating to the material life also such as the architectural tradition continued for a long time through the early historical period. The construction technique of the brick walls of Harappan buildings that is laying alternately courses of headers and stretchers designated as English bond by Western archaeologists could be recognized most commonly in the brick buildings of the early historical times particularly in the Deccan and south India. It should be particularly noted here that no buildings constructed in this fashion of the period between the end of the physical form of the civilization around 1500 BCE and the beginning of the early historical period from about third century BCE, have been traced.

How is this tradition continued to be surviving strongly and actively is a matter for the investigation.

Before some observations are made, certain limitations in the material evidences dealt with herein should be pointed out for further investigations:

1. As far as I know, the four-knot design of the type found on the copper tablets from Mohenjo-daro, is found only in that site so far. Similarly, the obliquely intersecting two squares with loops at the corners are occasionally found on a few seals.
2. The white painted black and red ware pottery in the non-Harappan Chalcolithic sites, found mostly as burial furniture. In Tekkalakota of the Krishna-Tungabhadra *doab*, though white painted black and red ware pottery have been found in the burials, it is not found in the habitational cultural deposit.
3. But not far away from Tekkalakota, in Halluru of the upper Tungabhadra this pottery is found in abundance in the Iron Age Megalithic habitation deposit. In the present state of research it is difficult to explain for its scarcity in the immediately preceding cultural stage and its abundance in the succeeding cultural stage. However, the distribution pattern and proportion of the pottery in the present state of our knowledge may indicate another route followed by the users of the white painted black and grey ware from the Gujarat region i.e. possibly the Sahyadri belt-the coastal land-the adjacent eastern up-ghat region.

SOME OBSERVATIONS

In India, there is a strong tradition of *mandalas* connected with various rituals and *yantras* and *mantra*s in the historical period both for the good and the bad for individuals and society. Relating to these there are many literary works also. In view of the elaboration, this tradition evidently must have come down from the Sindhu-Sarasvati Civilization strongly and wildly, and been growing through the ages. Here, it may also be noted such distinct *mandalas* have not been noticed so far in the contemporary non-Harappan and post-Harappan Neolithic and Chalcolithic cultures. It looks as though therefore that it is a distinct tradition of the Sindhu-Sarasvati Civilization. Therefore it goes without saying for understanding the antiquity and the various implications acquired through the ages of these *mandalas* it is very essential to study meticulously the Sindhu-Sarasvati Civilization in all its dimensions. Conversely, for understanding ritualistic implications of many of the Sindhu-Sarasvati traditions it is necessary to trace the corresponding traditions of the historical times backwards.

24

Legacy of Sarasvati-Sindhu Civilization

Ravindra Ramdas and Arun Nigudkar

OBJECTIVE

The disappearance of the river Sarasvati has scientific reasoning based on archaeological findings and geological causes, however the scope & attention of this paper shall remain on the impact this once mighty river has had on mankind.

This paper focuses on

1. Sarasvati , the Holy River
2. Sarasvati-Indus Civilization
3. Sarasvati-Indus Civilization and Kashmir
4. The Vedas, *Puranas*, *Ramayana* and *Mahabharata*
5. The vanishing act and its impact on the legacy

THE HOLY RIVER

"Ambitame, Naditame, Devitame Sarasvati. Aparasta Smasi Prashastim Amba Naskridhi."

Sarasvati you are the best of mothers, best of rivers, best of the divine goddesses and though we are insignificant grant us distinction. May the divine waters that flow down the slopes of hills on grounds high or low, nourish us, keep us healthy free from disease and cause us no harm.

RV. VII-36-6

These are the Vedic prayers invoking Sarasvati by the sages who lived on her banks thanking her for blessing them and all of mankind.

The Nadi Sukta, i.e. 10.75 refers to rivers Ganga in the east to Sindhu (Indus) along with its right bank tributaries Sutlej, Ravi, Chenab, Vitasta, Arjikiya, Sohan, etc.

Sarasvati is mentioned here to be between Yamuna and Sutlej (B.B. Lal – *The Sarasvati Flows On*, p. 4). *Ṛgveda* also tells us where the Sarasvati originated and its end (verses 7.95.1 & 7.95.2). Sarasvati is mentioned here a mighty river (Michel Danino) that provided to King Nahusa milk, honey and *ghee*, i.e. brought immense prosperity as she flowed from Himalayas to the Arabian Sea.

Sarasvati thus is regarded as a river deity.

THE SARASVATI-INDUS CIVILIZATION

The *Ṛgveda* has references that infer a hugely flourished civilization on its banks. The references of King Nahusa and the land of milk and *ghee* indicate to the prosperity of the way of life here (B.B. Lal. *op. cit.*, pp. 1, 4).

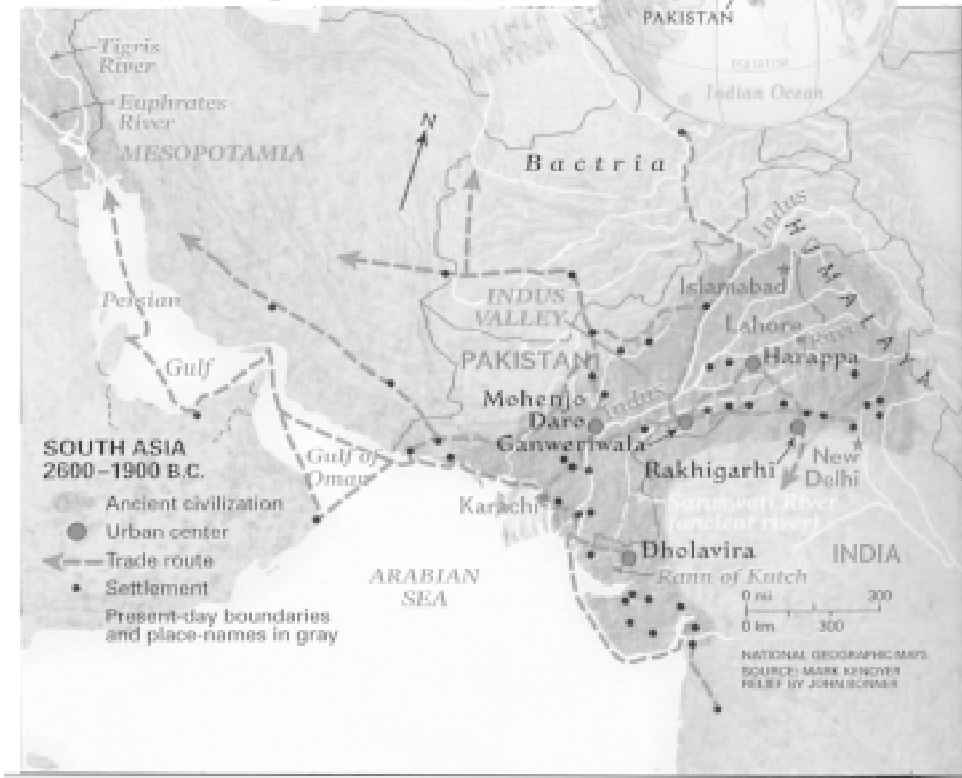
This way of living here spread across the Indian sub-continent over a span of 4000 years (Organizer – Geological dating – V.M.K. Puri and B.C. Verma). The spread and reach of this civilization that had its roots on the banks of Sarasvati is common to the Indus Valley (Dr. R.S. Bist) civilization unearthed. The river Sarasvati is believed to be older than any other major river in the Indian sub-continent. Thus the civilization that originated on its banks spread across the Indian sub-continent find traces in the archaeological findings of Mohenjo-daro and Harappa, revealing a hugely prosperous and culturally rich multivariate civilization.

Civilizations on the banks of Sindhu-Sarasvati (Mohenjo-daro and Harappa) and other sites. Lothal, Kalibangan, Banavali, Dholavira, Rupar, Rakhigari, Sothi or the Ganga had a common culture as is seen in the similarity in the design of cities. The roads as planned, the common baths, the dwellings and from whom the social life can be inferred. The submerged cities discovered in the 1980s on the coasts of western India show a similar social pattern (Balakot-Lothal-Dwaraka) over a period of 7000 years till the river disappeared in 1900 BC. The spread of this common civilization in modern day geographical boundaries is a territory of nearly 4000 km span stretching from Afghanistan in the West to Bengal in the east, from the Godavari plains in the south Maharashtra to Jammu and Kashmir in the north.

It was the worship of similar gods or goddesses.

"Namstey Sharade devi, Kashmir pura vasini"

Sarasvati being revered as a goddess is seen earlier. Another name for her is Sharada, meaning the goddess of learning whose abode is the region of Kashmir. Though in any other province prosperity and learning are talked



Map 1.

about separately where the Goddess Laxmi governs absolute wealth while Sarasvati stands for learning. This demarcation is not so distinct in the area of Kashmir where Vak-Vani, i.e. learning and Laxmi are synonyms. Wealth and prosperity is denoted by the word 'Sri' and where it resides is the capital of Kashmir and hence the place was called 'Srinagar'.

There is one theory that believes that Aryans were the natives of this land (Kashmir-Gandhar, Sindhu-Sarasvati) staying in this country for over 5000 years and more having a similar culture to the one we practice even now after all these years.

Rajatarangini of Kalhana which is regarded as the first written record of history mentions Gonand 1st who ruled Kashmir and was a contemporary of Pandavas. Many kings of the Pandava dynasty are listed by Kalhan's *Rajatarangini* such as Luv, Kush, Khagendra, Surendra, Godhar, Suvarna, Janak, Sachindra. (Appendix – *Rajatarangini*, pp. 708. 9-17). Raja Ramdeo of the Pandava dynasty built the Martanda temple in 2900 BC. *Nilamata Purana* still earlier refers to many verses on Sarasvati River.

This river is referred to by many names in Kashmir region, namely, Bhavani, Sudha, Gunadayini and Sharada (Sanjay Godbole, Kashmir Sentinel, Dec. 2007). The Sharada mandir is built near a confluence of two rivers Suddha and Sarasvati. The Sharada *peeth* which is also here is believed to be one of the earliest known universities or centres of learning has derived its name from this river. Sharada *peeth* or Suddha *peeth* as it is known brings out a strange relevance that of Suddha which is the other name for Sindhu. This by transference does convey that the river Sindhu (Indus) and Sarasvati (Dr. R.S. Bisht, pp. 24-25) are the same or have common origins. Kashmir also derives its name from the land of the Rishi Kashyap and Shardi is a place in Nila Valley where the *Nilamata Purana* was composed. *Nilamata Purana* carries references of Shandilya Rishi, Parvati and Balaram. These names known throughout India are still in vogue in Kashmir and have their roots there.

THE VEDAS, PURANAS, THE RAMAYANA AND THE MAHABHARATA

The *Ṛgveda* often refers to a mighty river Sarasvati and it is in Vedic literature that we read about its disappearance. This when taken in conjunction with scientific proofs, indicates that the *Ṛgveda* itself dates back to much earlier times.

The Indus is one of the most dramatic rivers in the world in both historical and geographical terms. It rises in the forbidden land of Tibet, from a spring called 'mouth of a lion' in the first part of its course; it rushes down between the greatest mountain ranges in the world, the Himalayas and the Karakoram. For hundreds of years monks and missionaries and merchants have travelled along its gorges. The man who determined to find the source of both the Brahmaputra and the Indus was Sven Hedin the great Swedish explorer. He had already discovered the headwaters of the Brahmaputra some sixty miles to the east, when looking now for the Singi Kabab, the mouth of the lion, he reached Lake Manasarovar in the summer

of 1907. It is also traditionally the source of the other three rivers of northern India. The four rivers are pictured as running out of it to the four points of the compass through the mouths of sacred animals: the Brahmaputra flows eastward from the mouth of the Horse, the Karnali a major tributaries of the (Ganges) south from the Peacock's mouth, the Sutlej west from the Elephant's mouth, and the Indus north from the Lion's mouth.

Although the Singi Kabab is some thirty miles from the Lake Manasarovar, the ancient tradition has proved to be not so very far wrong after all. The lake is sacred and symbolic, and it would be fitting that the great river should start from it, so in a symbolic way it does. If none of the four rivers flow out of Lake Manasarovar itself, all of them rise within a short distance and run at first roughly speaking, to the four points of the compass.

It is noted in the *Srimad Bhagavad* that the *Mahabharata* was composed on the banks of this holy river by Maharshi Vyas. Krishna's route from the Dwaraka to Indraprastha for the Rajasuya Yagna (10, 71- 21- 2). Balaram's pilgrimage from Dwaraka through Somnath and Mathura along the banks of river Sarasvati offering homage to his ancestors refers to Pritudakam, Bindusara, Tritakupa, Sudarshana, Bramhatirtha, Chakratirtha and Prachi Sarasvati are the places touched in the route.

The recent Satellite pictures clearly show the path of flow of the ancient river Sarasvati. Archeological and Geological research points out that the Sarasvati flowed almost parallel to the Indus and dried up during 1900 BC.

The river Sarasvati should be of special interest to us because Vedic records quote legends and anecdotes. Those that are intertwined in the river's brief existence from its journey down the Himalayas and over the plains to the Sindhu Sagar (Arabian sea), anecdotes and references in *Ṛgveda*, *Yajurveda*, *Atharvaveda*, *Brahman* Literature, *Manusmriti*, *Mahabharata* and the *Puranas*.

THE VANISHING ACT AND ITS IMPACT ON THE LEGACY

The tectonic movement that caused the Aravali to rise and shift the course of this river finally resulting in its demise had a huge impact on the civilizations existing and the ones to come.

To list out the contribution of the river Sarasvati in brief to the Indian Civilization

- The civilization that existed developed on its banks as is seen from the findings of the pottery at Kalibangan. Art and craft

developed on its banks and the first instances of jewellery in its various patterns was discovered (B.B. Lal, *The Sarasvati Flows On*).

- A drainage system that interconnected houses and fields so also seen in the common baths was found in the excavations. (A.V. Sankaran, *Current Sci.* Vol . 77, No. 80 25 Oct. 1999).
- Pottery (Rakhigarhi) and farming as a trade and craft developed on its banks as is seen from the wheat fields of Kalibangan. The use of bullock carts in farming and material movement is also noted.
- The form of holy worship through the use of 'altars' found at Banavali.
- The system of writing on *mudrankas* that started about 3500 BC.
- 'Nadi Stuti' defines the use of milk, honey and water in its use in daily life if taken in its literary sense.
- Sanskrit as a language developed on the banks of the river Sarasvati. This language through trade and wars spread to the neighbouring kingdoms of modern day Afghanistan, Bactria Kashmir, Punjab, U.P., Bihar and countries like Turkey, Syria Iran and even in the South. Its influence can be seen in the existing languages that are spoken in the south.
- The spoken language was Sanskrit while the written script Bramhi. The Bramhi script has similarity with the Tamil Munda and nearly 5000 odd words are Sanskrit based (Dr. S. Kalyanaraman).
- In a nutshell on its banks the river Sarasvati cradled and lay foundations to the arts, crafts, culture and trade that are seen in all parts of the country and traces found elsewhere in the world.

These inferences have historical and archaeological support. The existence of the River though a cause for debate was never in doubt. Usage of modern science has enabled the mapping of the course of the river through Archaeo-Astronomy, Remote Sensing and Satellite pictures.

ISRO has the capability to do this and carry it further like they have in the past.

To conclude the legacy of the river Sarasvati is huge in its scope and would like to end this with a poem by Allama Iqbal

"Yunan-E-Misra-Ruma sub mit gaye jahan se
Ab tak magar hai baaki namo nishan humaara
Kuch baat hai ki hasti mitati nahi humari
Sadiyo raha hai dushman daur-i-zaman humara"

The ancient civilizations of Greece, Egypt and Rome have come to an end, but we (of the Indo-Sarasvati) are still around here. There must be something special in us that allow our survival and growth through the various onslaughts of the invaders. Doubtless it comes from the liberal character of Indian Civilization which allows cross-cultural assimilation and that had its foundations on the banks of the mighty holy River. This is the legacy that lives on.

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Civilization along the Sarasvati River – A Scientific Approach

A.R. Chaudhri

ABSTRACT

Civilizations develop when natural environment is conducive for their growth. The vast alluvial plains of north-western India have been deposited by major rivers draining the region since time immemorial. After the Last Glacial event in India, the temperature gradually rose and there was abundant moisture and amicable climate which might have supported the development of Vedic Civilization in Indian subcontinent around 6th century BC. In the present day scenario, no perennial river except Yamuna traverses the state of Haryana. Signatures of the presence of palaeo-mega river channels have been identified at different places in Haryana. The dense mineral suite recovered from sediments coming out with water at Kalayat is characterised by the presence of minerals derived from Indus-Tsangpo Suture Zone (ITSZ) suggesting that a mighty trans-Himalayan glacier fed river flowed along the Vedic Sarasvati route in the state. A buried river bed with 2 km wide flood plain near Kurukshetra presents a mesmerising scenario that might have prevailed in the Quaternary time. Remote Sensing studies reveal that major drainage diversions were caused due to Quaternary tectonics in the Himalayan terrain. Interestingly, archaeological and mythological sites in Haryana line up along this Vedic palaeo-river path thereby presenting an exciting preposition – Is this a journey from myth to reality!!!!

NORTHERN INDIAN CIVILIZATION – ARCHAEOLOGY, HISTORY, RELIGION AND BELIEF

Civilizations originate and develop in those parts of the continents where abundant supply of fresh water, fertile land and amicable climate are available. Communities indigenous to the Indian subcontinent and a host of foreigners including tourists, business men and invaders who lived and settled in the subcontinent are closely linked to the synthesis and formation of Indian civilization. The age of Indian civilization is a matter of conjecture as the Vedas, which constitute the oldest available literature are believed to be utterances of God as revealed to divine ascetics and transmitted by them, down the generations, in verbal form. Besides the Indian subcontinent, ancient Indian Hindu kingdoms flourished in Thailand, Malaysia, Indonesia and Vietnam. The British anglicized the original Sanskrit name of the nation *Bharat* as India due to its proximity to the Indus River.

In the northen part of the Indian subcontinent, the Indus Valley Civilization (c. 3000-1500 BCE, Mature period 2600-1900 BCE), abbreviated IVC, forms the dominant ancient civilization that flourished in the Indus River basin. The remnants of this civilization are found in the Sind, Punjab and Baluchistan provinces of Pakistan; in the states of Haryana, Gujarat and Rajasthan in India; and in Afganistan, Turkmenistan and Iran. The mature phase of this civilization has been named as the Harappan Civilization after the Harappa City of Pakistan where it was first excavated. Excavation of IVC sites has been ongoing since 1920, with important breakthroughs occurring rather continuously.

The Harappan Civilization is sometimes referred to as the Indus Ghaggar-Hakra Civilization (Ching *et al.* 2006) or the Indus-Sarasvati Civilization based on the possible identification of the Ghaggar-Hakra River with the Sarasvati River. Gupta (1995) recorded that over 500 Harappan sites have been discovered along the dried up river beds of the Ghaggar-Hakra River system and its tributaries in sharp contrast to about 100 along the Indus and its tributaries (Mishra, 1992). This nomenclature is, however, debated on linguistic, geographical and political grounds. The Bronze age Harappan civilization is regarded as the oldest documented record of urban settlement in the Indian subcontinent with well established knowledge in weights and measures, written script, art and craft, metallurgy, dentistry and maritime trade.

Recently, however, marine scientists from NIO, Goa carried out deep water acoustic imaging near Dwarka, in Gulf of Cambay which indicated the presence of symmetrical man-made structures, resembling Harappan structures, and a palaeo-river running for about nine kilometres. Along the

bank of this river, numerous artefacts were discovered. Carbon 14 dating carried out on one of these artefacts – a block of wood bearing the signs of deep fissures – suggested its age to be around 7,595 BC. Palaeolithic sites dating back around 20,000 years have been found along the coast of Gujarat.

Vedas, the venerated Hindu texts, are replete with references of a major river which drained the northern part of the country. This mythical river, named as the 'Sarasvati River', is eugolised as the mother of all the seven rivers draining the region. The Sarasvati River is supposed to have originated in the glaciated region of the Himalaya and during its passage to the Arabian sea the river roared as it carried peaks of newly upheaved mountains as flowers in its flow. Along the path of the Sarasvati River flourished numerous agrarian civilizations, and hence the vedic couplet '*Ambitame, Devitame, Naditame Sarasvati*'. Thus, the largely agrarian Sarasvati River Civilization appears to predate the largely urbanized and mercantile Indus Valley Civilization.

The epic *Mahabharatha* has a description of Balaram, the elder brother of Lord Krishna travelling in a boat through Sarasvati River during a pilgrimage from Dwarka to Mathura. The battle of Mahabharata was fought in the fields of Kurukshetra which were dotted by hermitage sites of numerous renowned ascetics along the course of river Sarasvati. The present day Thanesar township, Asthipura, Sannhit Sarovar and the Brahma Sarovar at Kurukshetra; present day Jyotisar, which is the site of celestial song the *Bhagavad Gita*; Bhagwanpur, Daulatpur and the Sarasvati *Teerth* at Pehowa where people from northern India perform rituals for their deceased family members are believed to be the undisputed sites along the erstwhile Sarasvati River in the Kurukshetra District of Haryana.

SCIENTIFIC STUDIES ON SARASVATI RIVER

Oldham (1886) pioneered the study of presence of a mighty Himalayan river in northwestern alluvial plains which dessicated due to drainage readjustments. He inadvertently tried to link Hindu scriptures (Vedas) with geology. Subsequently, signatures of palaeo-drainage of rivers that drained the region have been worked out by numerous workers including Oldham (1893), Yash Pal *et al*. (1980), Valdiya (1996), Radhakrishna (1999), Thussu (1999), Valdiya (2002) and Gupta *et al*. (2004). Chaudhri (2007a, 2008a) recorded the tectonic signatures of Quaternary drainage readjustment which resulted in the transformation of major rivers into ephemeral streams in the northwestern Himalayan region. Along the palaeo-course of this river and its erstwhile tributaries, flourished numerous agrarian civilisations. In Haryana, about 103 Early Harappan (2500-2200 BC) archaeological sites

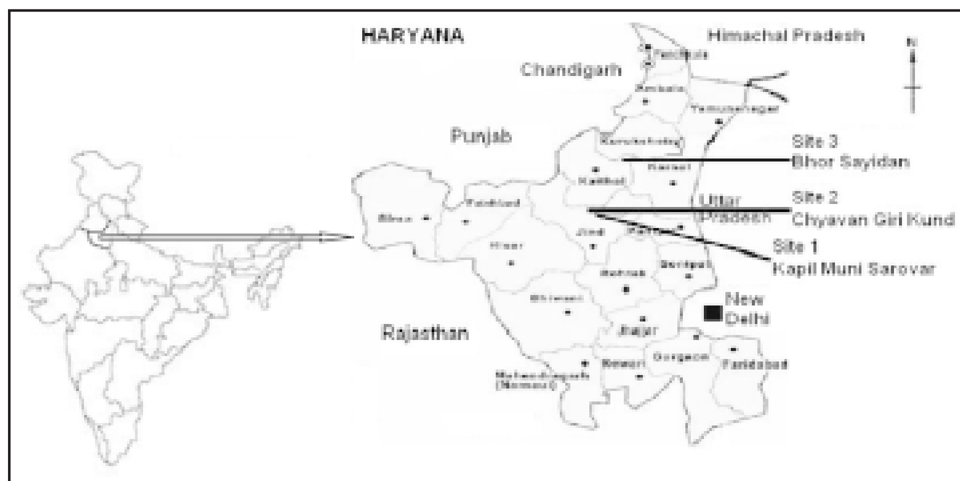


Fig. 1. Map of Haryana showing the location of sites where signatures of the presence of a mega-river have been identified.

(Sahai, 1999) related to Sarasvati River Civilization have been identified. These sites fall in Ambala, Kurukshetra, Jind, Sonipat, Rohtak, Bhiwani and Hisar districts (Kalyanaraman, 1999). Archaeological and scriptural studies which attempted to trace the path of this lost river have been carried out by Stein (1942), Wakankar (1987), Bhardwaj (1999), Chauhan (1999), Frawley (1999) and others.

The search for Sarasvati River got a fillip in 2004 when suddenly water started oozing out of Kapil Muni temple sarovar at Kalayat in Jind district of Haryana (Fig. 1).

Subsequently, water started pouring out of the Chyavan Giri Kund in Kalayat. Then a buried river bed was accidently discovered near Kurukshetra. This created quite a stir in water scarce region of the state and the story was covered repeatedly by all national and vernacular dailies and national TV news channels (Chaudhri, 2008b). The author carried out a detailed geological analysis of these signatures of the presence of a mega-palaeo river in Haryana and the Himalayan region which are being presented in this paper.

GEOLOGY OF HARYANA

The state of Haryana is spread over 44,212 sq. km (Fig. 2). The Frontal Siwalik Hill range comprising the Lower and Upper Siwalik formations (Mid. Miocene to Lr. Pleistocene) form the northern boundary of the state. The hills abut against the Ghaggar-Yamuna alluvial plains in Panchkula, Ambala



Fig. 2. Schematic geological map of Haryana showing the disposition of major drainage channels.

and Yamuna Nagar districts. The thrust junction between the two is termed as the Himalayan Frontal Thrust. The Siwalik hills have an altitude varying from 900 m to 1200 m and form the present day catchment of seasonal rivers which drain the state. These include the Ghaggar, the Tangri and the Markanda rivers. The alluvial plains are made up of inter-layered multi-cyclic sand, clay, silt and hard calcareous kankar deposits. These are divided in 2 parts – the higher one is called 'Bangar' and the lower 'Khadar'. The southern districts of the state are contiguous with desert plains of Rajasthan and form semi-desert sandy plains in parts of Sirsa, Hisar, Mahendergarh, Fatehbad and Bhiwani districts. The Aravalli hills having a NNE-SSW

regional trend form the southernmost geographical feature in Mahendargrah and Bhiwani districts. The depth of alluvium is greatest in the vicinity of Himalayan foredeep region and gradually shallows towards the south wherein the Aravalli hills form a topographic high. Based on deep electrical soundings (Shukla, 1999), the inferred thickness of unconsolidated alluvium is estimated to be of the order of 703 m at Panchkula, 1838 m at Yamuna Nagar, 1655 m at Ismailabad, 1103 m at Kaithal, 689 m at Panipat and 736 m at Fatehbad. At many places in the southern districts basement rocks are exposed on the surface. Numerous basement faults and ridges make these plains tectonically active.

DRAINAGE

Ghaggar is the major seasonal river in Haryana, which after originating near Sarahan in Himachal Pradesh, enters the state near Pinjore (Fig. 2). The path of the river closely follows the inter-state boundary between Haryana and Punjab and the river finally enters the state near Sirsa from where it moves on to Bikaner before disappearing in the deserts of Rajasthan. Tangri is a relatively small seasonal stream and is a tributary of the Markanda (Aruna) River which originates near Nahan (Lesser Himalaya) and enters Haryana near Ambala. Sarasvati stream is a small seasonal rivulet which originates near Machhrouli in Yamuna Nagar district and joins Ghaggar river near Sagra. Somb stream originates in the frontal Siwalik hills near Adi Badri and carries water during rainy season. River Yamuna is the only perennial river which after originating from Yamnotri glacier in Garhwal Himalayas, Uttrakhand, skirts the eastern boundary of the state with Uttar Pradesh from Hathnikund to Palla before entering Delhi. All these rivers have a southwesterly flow direction which is in sharp contrast to the southern rivers of the state, namely, the Sahibi, Indori, Dohan and Kasavati which flow from south to north, apparently due to change in topography.

FIELD OBSERVATIONS AND METHODOLOGY

Remote Sensing studies of the Sarasvati River palaeodrainage have indicated presence of palaeochannels in Haryana. Unfortunately, there are no surface geological evidences to support this fact.

On the basis of sedimentological investigations carried out by the author, three significant signatures of the presence of palaeochannels are identified along the Vedic tract of the erstwhile Sarasvati River. The widely spaced signatures include water coming out of Kapil Muni temple sarovar and Chyavan Giri Kund at Kalayat in Jind district and presence of buried river bed at Bhor Sayidan in Pehowa district. Sedimentological investigations

including textural and dense mineral analysis of the sediments coming out with water have been carried out to ascertain their major depositional environment and provenance.

Dense mineral (Specific Gravity more than 2.89) assemblage is used for source rock identification; to work out the heavy mineral zones and dispersal pattern, correlation of unfossiliferous strata; to determine the vagaries of pre-erosional weathering and tectonic history of source terrain; to understand the diagenetic changes including role of intrastratal solution; and basin analysis (Chaudhri, 1971). Morton (1991) suggested that multiple source areas can be differentiated on the basis of heavy mineral assemblage.

Heavy mineral analysis of the 63-250 μm size fraction of the sediments was carried out by heavy liquid separation technique (sodium polytungsate) to ascertain their source terrains and compare these with those of the Siwalik Group. A significant aspect of the study is to determine as to whether the fluvial channel(s) that deposited these sediments at Kalayat in Jind district of Haryana and other sites was a seasonal rivulet originating some where in the Siwalik hills with reworked Siwalik sediments or was it a major river originating in the glaciated Higher Himalayas and having some definite Higher Himalayan mineralogical inputs.

SITE 1: KAPIL MUNI TEMPLE SAROVAR, KALAYAT, DISTRICT JIND, HARYANA

The hermitage sites of ancient *rishis* and ascetics are usually situated close to some perennial source of water. Kalayat is one of the pilgrimage spots in traditional 48 *kos* Kurukshetra *Bhumi* and is dedicated to Saint Kapil, the author of Hindu Sankhya philosophy. A few kilometres from Kalayat lies the IVC site Balu. It is believed that the Sarasvati River used to flow through Kalayat (Chaudhri, 2007b). The Kapil Muni (6050 BC) temple located at Kalayat is in a brackish water zone where no natural surface flow of water is discernible. In the vicinity of the temple is an old *sarovar* which is ritually cleaned and filled by local religious organizations. In December 2005, during the cleansing process, shallow digging was carried out along the periphery of the brick walled nearly dry water body and water started oozing out. The water was clear, odourless and sweet to taste and had a lower TDS content in comparison to the local municipal supply water (Chaudhri, 2006). The presence of natural flow of sweet water created a stir in the water starved region (Chaudhri, 2007c). The gush of water, which was initially like an artesian flow, subsided after about a fortnight but the water still continues to flow. The sediments coming out with oozing water were collected in a sieve for textural and heavy mineral investigations.

Megascopically, the sediments are dark grey in colour and contain high percentage of muscovite flakes with golden ferruginous coating making them appear significantly different from the surrounding sediments. Textural studies reveal that the sediments are fine grained. Majority of the grains are angular to sub-angular in outline although a few sub-rounded and rounded grains are also present. The sediments coming out with water show a moderately well sorted nature. These characteristics of the sediments reflect the probable character of the aquifer sediments, the carrying capacity of the flow of water which brought them to the surface as also the mixing by sediments enroute the pathway of water from the underground source to its surface extrusion.

The heavy mineral suite recovered from the Kapil Muni temple sarovar comprises tourmaline, hornblende, kyanite, staurolite, epidote, zoisite, garnet, biotite, chlorite, corundum, rutile, titanite and brookite (Fig. 3).

The heavy mineral assemblage of the Siwalik Group has been investigated by Chaudhri (1972, 1975, 1984, 1991). The dense mineral suite

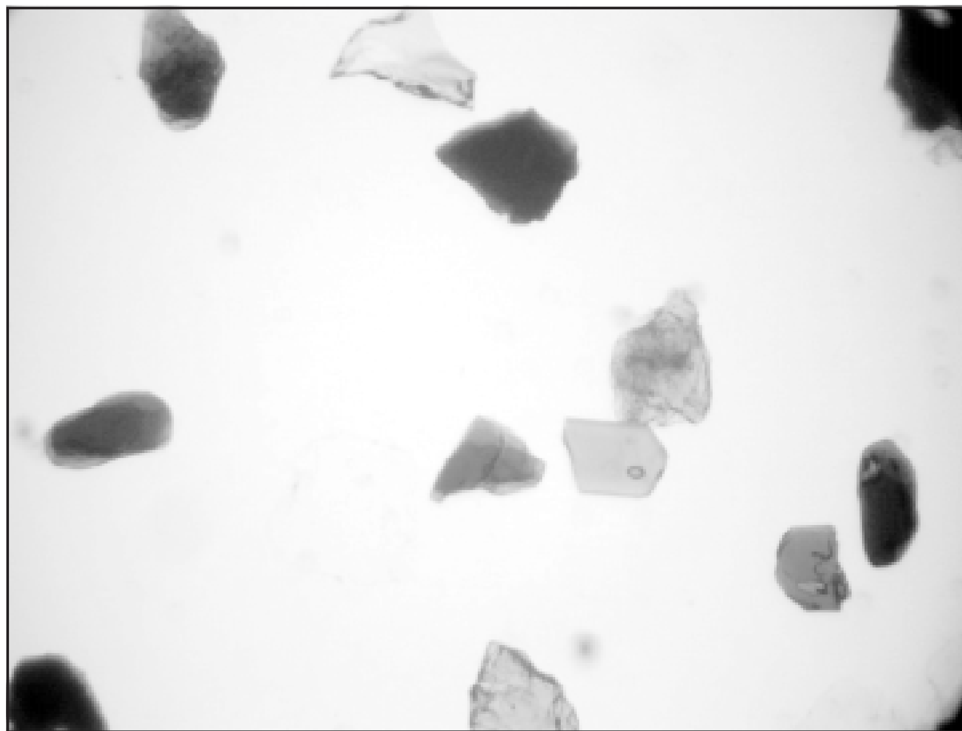


Fig. 3. Photomicrograph of angular fragments of dense minerals recovered from Kalayat.

comprises zircon, tourmaline, rutile, epidote, garnet, chlorite, biotite, staurolite, kyanite, sillimanite and rare to very rare andalusite, enstatite and hornblende. The opaque minerals include ilmenite, magnetite, hematite and limonite (Chaudhri, 2000).

The heavy mineral suite of Kapil Muni temple sarovar thus contains corundum, brookite and titanite in addition to the heavy minerals from the Siwalik Group of northwestern India.

The mineral assemblage garnet, hornblende, kyanite, staurolite, epidote, zoisite and biotite is indicative of derivation of the sediments from high grade metamorphic rocks. Rutile and brookite might have been derived from basic igneous rocks while titanite and part of hornblende appear to have been contributed by acid igneous rocks. Titanite is frequently associated with ultra high pressure (UHP) metamorphism (more than 6 GPa) in subduction zone plate setting in high-pressure granulite-facies terranes (Ye, 2002; Chopin, 2003) now exposed in the Indus-Tsangpo Suture Zone. Honneger *et al*. (1989) reported blueschists along the Indus Suture Zone in Ladakh as tectonic thrust slices, as isolated blocks within mélange units and as pebbles within continental detrital series. The mineral assemblage in metabasic rocks are characterized by the presence of lawsonite-glaucophane/crossite-Na-pyroxene-chlorite-phengite-titanite albite stilpnomelane. Parrish *et al*. (2006) evidenced peak UHP metamorphism along the northern margin of the Indian plate in Pakistan Himalayas at 46.4 0.1 Ma and retrogressive growth of titanite between 46.4 and ca. 44 Ma, indicating that the eclogites were exhumed to 35 km depth at or before 44 Ma. This is indicative of very rapid exhumation rates within the mantle of 30-80 mm/yr which are comparable to the then existing rapid plate velocities. Occurrence of corundum is spatially related to zones of metasomatic alterations in calcite and dolomite marbles and crystalline schists. In northwestern Himalayas, corundum has been reported from Early Palaeozoic, Pan-African (500 50 Ma) granites that intruded the Chail, Salkhala, Haimanta Formations in the Lesser Himalayas, Zanskar crystallines, and Lower Taglang La of Tso-Morari crystallines in the northwestern Himalayas (Islam *et al*. 1999).

The heavy mineral assemblage of the sediments coming out with water, thus, reveals that the sediments have a definite Higher Himalayan input. Since the water channel that brought these sediments must have crossed through the Siwalik sediments, mixing of sediments from the Higher Himalayas and the Lesser Himalayas is inevitable. Further, majority of the sediments have angular to sub-angular outlines. The dominant mechanism of fluvial transport of dense minerals having specific gravity more than

2.89 in water is by traction and rolling on the river bed. This process ensures maximum rounding of the grains consequent to the breaking up of their corners on account of friction and attrition in the first hundred kilometres of its fluvial transport. Rounding of the grains is more for the coarser fraction than that for the finer grades. Angular kyanite is characteristic of high current velocity depositional environment. The presence of a high percentage of angular fragments at Kalayat, about 280 km away (crow flight distance) from their perceived source rocks in Higher Himalayas, is anomalous in normal fluvial dynamics. This feature requires that the high density mineral grains are carried as suspension in the river for the major part of their travel from the point of entrainment in the flow in the Higher Himalayas to the point of their deposition at Kalayat in Haryana. This in turn would require the presence of highly agitated water. Agitation in water is related to the morphology of the river channel and quantity of water in it. Considering the dynamics of the present case, it appears that the water channel that carried these sediments was a massive river, with very high volume of agitated water. These characteristics of the river, incidentally and interestingly match very well with the Vedic description of the Sarasvati River, 'a river that roared as it carried peaks of mountain as flowers in its flow'. Further, the strategic location of the site, near the 6th century BC hermitage site of Kapil Muni whose *ashrams* were on the banks of Sarasvati River, further strengthens the possibility of the presence of Sarasvati River palaeochannel near Kalayat.

SITE 2: CHYAVAN GIRI KUND, KALAYAT, DISTRICT JIND, HARYANA

In August 2007 water started coming out of Chayavan Giri Kund, a hermitage of Chayavan *rishi* in Kalayat. The water which was pouring out at 4 locations in the *kund* was again sweet to taste. The rate of flow of water was around 25 litres per minute (Chaudhri, 2007d). The water was clear, non-turbid, odourless and very little sand was coming out with it. The sediments coming out with water were collected on – 80 mesh ASTM sieve.

Megascopically, the sediments are grey in colour and are visibly fine grained in comparison to the sediments from the Kapil Muni temple sarovar. The sand has moderate proportion of muscovite flakes. The golden coloured flakes are conspicuous by their absence.

Textural studies of the sediments reveal their fine sand size and moderately well sorted nature. The sand sized fraction was cleaned and heavy liquid separation technique was utilized for separating the dense minerals. The transparent heavy mineral suite recovered from the water



Fig. 4. Chyavan Giri Kund, the site is maintained by ASI. The brick temple is a protected archaeological monument.

coming out of the Chyavan Giri Kund comprises tourmaline, hornblende, kyanite, staurolite, epidote, zoisite, garnet, biotite, chlorite, corundum, rutile and titanite. This heavy mineral assemblage is nearly similar to the earlier assemblage recorded at Kapil Muni temple sarovar.

The phenomenon of water oozing out of Chyavan Giri Kund is interesting considering the general groundwater scenario in the region. The region falls in brackish water zone and potable water having acceptable taste is not available to the people of the region even up to a depth of 400 m. Beyond this level, the quality of water improves but still it does not reach the level of sweetness of the Chyavan Giri Kund water. Further, this phenomenon took place in August 2007 and incidentally there was no rainfall for the past 20-25 days in the region. This situation suggested the possibility that the deeper aquifer which was yielding water on account of the presence of some structural discordance in its path was getting recharged in the upstream recharge zone as significant rainfall was occurring in the Himalayan foothill region which forms the recharge zone of deeper aquifers in the region. The author is deeply involved in 'Sarasvati Project' which



Fig. 5. Water pouring out of Chyavan Giri Kund and sediments being collected in sieve.

aims at exploring the deep water aquifers associated with Sarasvati River Palaeochannels in the state of Haryana, Rajasthan and Gujarat. The water coming out of Chyavan Giri Kund reaffirmed the author's belief that deeper aquifers in the state of Haryana are getting recharged and the possibility of finding hitherto unexplored huge reserves of fresh water are immense.

SITE 3: BHOR SAYIDAN, PEHOWA, DISTRICT KURUKSHETRA, HARYANA

About 13 kilometres west of Kurukshetra (Thanesar) towards Pehowa lies the Bhurisrava Tank. It is believed that at this place Arjun treacherously murdered Bhurisrava during the Mahabharat war. Bhurisrava was the son of Somadatta, king of Varanasi. The village is named Bhor after him. This small village is situated on an ancient mound. The houses are built of old large size bricks having a size of 12 3/4" x 9 1/2 "x 2".

A buried river bed has been discovered in Bhor Sayidan village in Kurukshetra district (Fig. 6). The estimated width of this palaeo-river is

more than 2 km. The left bank of the erstwhile river is covered by 9 m thick layer of intercalated light chocolate brown sandy clays and mud. Twelve beds have been identified in the succession.

The site is probably linked to an earlier buried habitation as is evidenced by the presence of numerous painted greyware pottery fragments probably dating prior to 1375 BC. The palaeo-river berm is an ancient linear elevated ridge rising about 2 m to 3 m above the normal ground level in the area. An ancient mud-brick lined well is observed well preserved along the vertical cut section of the left bank of this palaeo-river at a depth of about 3 m from the berm level. It appears that in ancient time this well was constructed on the banks of this river by the people living in the now buried habitation.

The textural analysis of the sediments was carried out by sieve analysis. Sieving was carried out at quarter phi interval. The results indicate presence of fine to very fine grained, polymodal, moderately-to poorly-sorted sediment population. The sediment characteristics are typical for low energy river bank and levee deposits. Shape of the grains was determined by visual estimation technique. Majority of the grains exhibit sub-angular to sub-rounded outlines while significant percentage of angular grains have also been recorded.

The source rocks of the alluvial sediments which constitute the left bank of the erstwhile river were determined on the basis of their dense mineral suite. The non-opaque heavies from Bhor Sayidan comprise garnet, epidote, hornblende, kyanite, sillimanite, tourmaline, chlorite, cassiterite, biotite and muscovite. The heavy mineral assemblage of the sediments is nearly similar to those of the Siwalik sediments exposed in the frontal Siwalik hills. The Siwalik sediments were mainly derived from the tectonically active Himalayan land mass and represent products of incomplete mechanical fragmentation which were deposited after a short transport into the foreland basin (Chaudhri, 1991, 2000).

These fluvial sediments reflect the terminal waning phase of the erstwhile 2 km wide river in the vicinity of Bhor Sayidan as there is a distinct break in the lithologic succession with mud beds dominating over sand beds in the upper 5 m long. At a depth of 5 m from the surface, sand layers start dominating over the mud layers and gradually sand beds become dominant. Mud layers are reduced to thin intercalations and lenses. It appears that during the terminal phase there was gradual dessication of the river and the channel was subsequently periodically filled by muddy rainwater that might have travelled in the channel upon its conversion to a seasonal stream from an erstwhile mega-river. In the present day scenario, 2 km wide river beds are nowhere seen in the region except the remotely sensed inferred palaeochannels in Rajasthan and Rann sector of Gujarat.

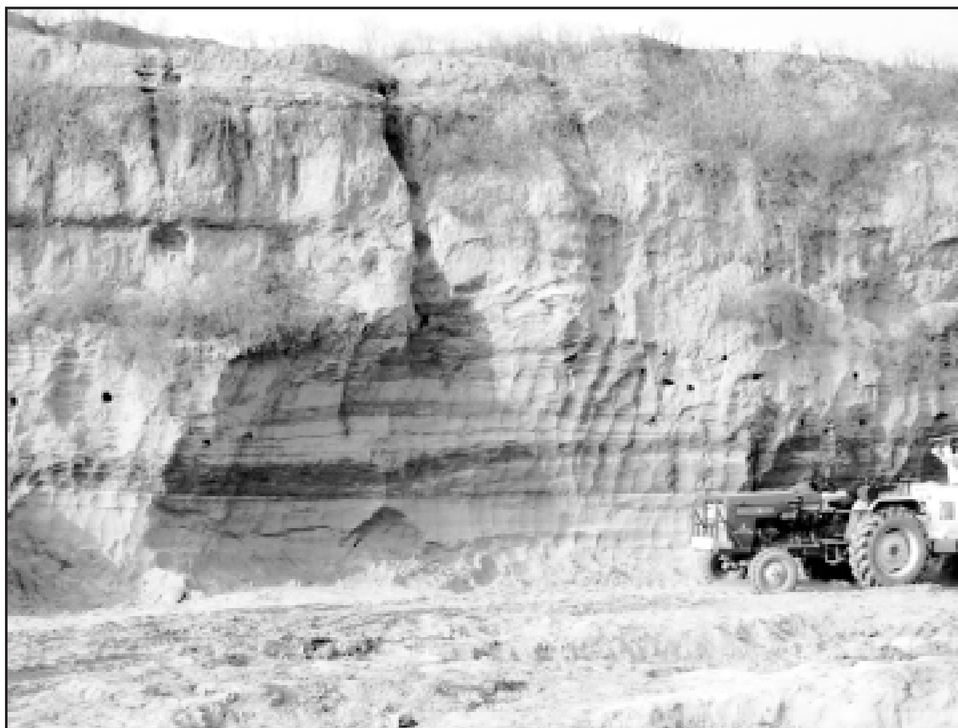


Fig. 6. Buried river bed at Bhor Sayidan near Kurukshetra. The estimated width of this river is over 2 km.

The wide flood plain of the palaeo-river, its sedimentological characteristics and its vedic location contribute in suggesting that the palaeochannel might be of a major palaeo-river, probably, the Sarasvati River. OSL dating of the sediments is in progress and it might contribute in a better understanding of the then prevalent scenario.

DISCUSSION AND CONCLUSIONS

Sarasvati River has been intricately woven into the psyche of every traditional Indian. Goddess Sarasvati, as per Indian mythology, bestows knowledge and wisdom on the seeker. Sarasvati River finds a prized superlative position in terms of its benefits to the then existing population in the sacred Hindu texts, the Vedas. As such, the river has been the cynosure of majority of the researchers and common people who try to unravel the mystery associated with this river and contribute their individual bit for the benefit of their fellow citizen.

In the Indian context, there are three major antecedent rivers existing in the present day scenario. These are the Indus, the Satluj and the

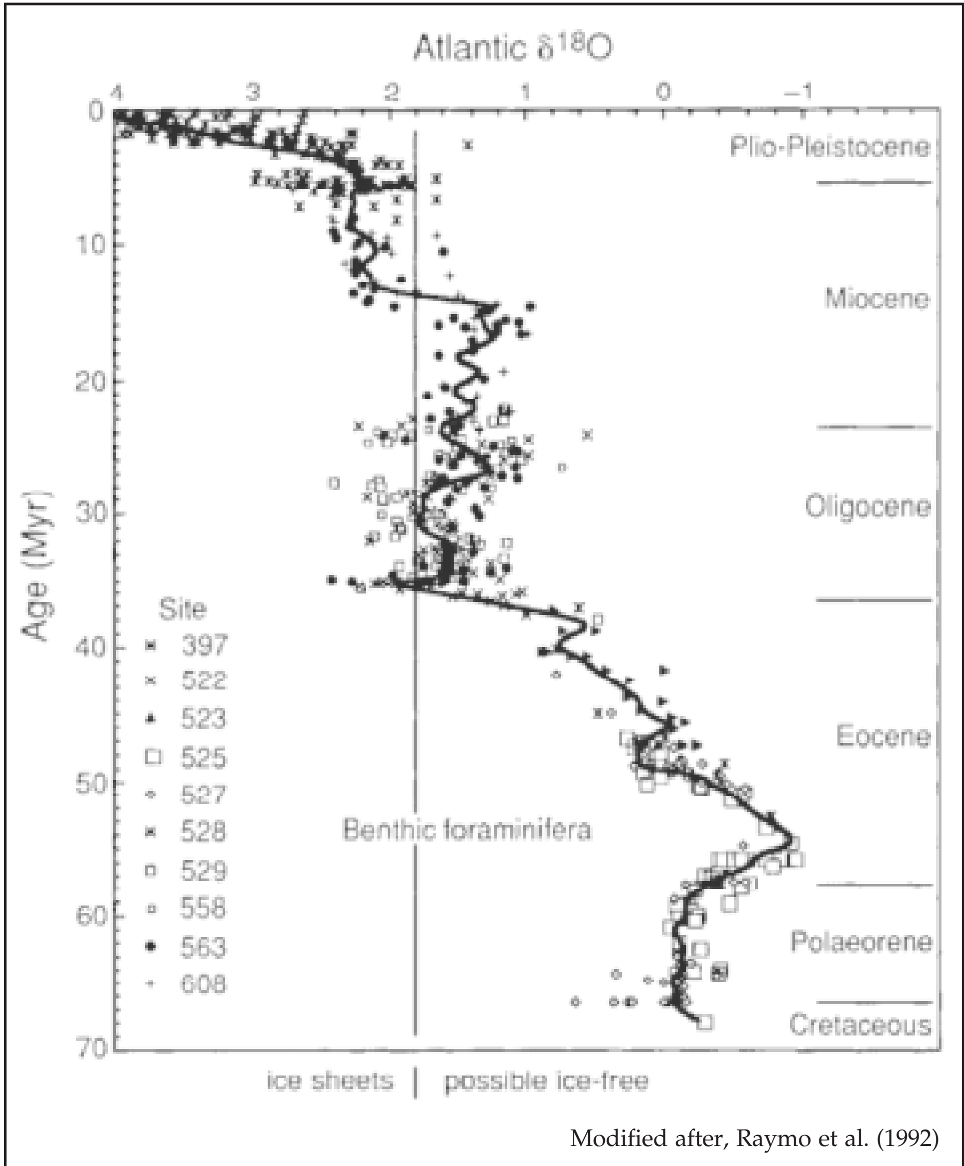


Fig. 7. δ^{18}O record of calcite from deep sea sediment cores indicating onset of global cooling since Oligocene time.

Brahamputra. All of these rivers have their origin in the vicinity of Mt. Kailash indicating thereby that this part of the Himalayan terrain was at a higher elevation than the rest of the intervening Himalayas since the time of India-Eurasia collision in the Miocene. These rivers, along with some

other significant channels might have started flowing southwards after the melting of glaciers. The first significant glaciation on global scale is supposed to have taken place about 34 Ma ago when Antarctica became glaciated for the first time (Deconto *et al*. 2003). Another major evidence of glaciations and hence the cooling of climate during Cenozoic comes from ^{18}O record of calcite from deep sea sediment cores (Figure 7), which represents a detailed record of both temperature and glaciations during the Cenozoic era. During global glaciations the lighter isotope of oxygen (^{16}O) is preferentially taken up into ice masses, which results in the concentration of heavier ^{18}O isotope in ocean water. In addition to this, the ^{18}O content of calcite is dependent on the temperature at which calcite forms, with cooler temperatures resulting in calcite that is depleted in ^{18}O relative to calcite formed in warmer temperatures. These two fractionation effects produce a general trend of increasing ^{18}O in calcite as global temperatures drop and glaciation ensues, and decreasing ^{18}O in calcite as global temperatures rise and glaciers melt.

Thus, it is safe to assume that major trans-Himalayan drainage gradually established itself in the later part of the Cenozoic Era. Incidentally, it was during this time bracket that all the major regional structures of the Himalayas came into being as a consequence of thrust tectonics. The Main Central Thrust (MCT) was active from 26 Ma to 7 Ma (Hubbard and Harrison, 1989). White *et al*. (2002) worked out a major spatial change in the Himalayan orogenic wedge around 17 Ma which resulted in the southward migration of the active thrusting from the MCT and cessation of rapid exhumation of the metamorphic slab. The Main Boundary Thrust (MBT) was active around 10 Ma (Meigs *et al*. 1995). The Himalayan Frontal Thrust initiated at about 1.7 to 1.5 Ma (Valdiya, 2003) and is still active. During this tectonically active period in the history of Himalayas, new terrains in the Himalayan domain were repeatedly uplifted causing repetitive obstructions in the flow of the then established river system. Chaudhri (2005) documented the offset of rivers flowing in the vicinity of Chandigarh on account of active faulting in the region. Rivers in the Himalayan domain have enormous power and cut deep gorges in mountains in their effort to maintain their flow direction despite uplift of the terrain. However, some of the rivers, tend to take the available path of least resistance, and in the process, are captured by other rivers.

Studies to identify the existence of Sarasvati River have focused on either the habitations that were supposedly nurtured by this river and its tributaries or on remote sensing applications, geomorphological aspects and drainage investigations.

Majority of the workers have attempted to explain the dessication of Sarasvati River on the basis of change in surface morphology and consequent diversion/capture of the dominant water channel due to tectonic causes in the alluvial plains. Investigations carried out by the author reveal that the major drainage diversions occurred in the Himalayan terrain rather than in the alluvial plains. Remote Sensing analysis of drainage pattern of river Satluj reveals a significant drainage diversion near Shimla in Himachal Pradesh besides the diversion near Ropar (Yashpal *et al*. 1980). Ashni River and Giri River exhibit anomalous right angle turns on account of remobilization of the crust in the Lesser Himalaya due to renewed tectonic activity which resulted in the formation of an elongated wedge shaped upheaved landmass. The Himalayas attained their maximum elevation during the Late Quaternary uprising. Satellite images reveal that had this landmass not risen, the Giri and the Ashni River would have drained into the Ghaggar River. Massive palaeo-valleys of these rivers are quite evident on the imagery.

Human Civilization dates entirely in Holocene Epoch. Thus, since the Sarasvati River finds mention in the epics, then it is quite evident that this river system might be existing, at least in the Atlantic Chronozone (8 Ka to 5 Ka) which was the warmest and most moist period in the Holocene. The climate was at its optimum best and was most suited for growth of vegetation and consequently supported agrarian civilization. This chronozone corresponds to Pollen Zone VIIth. During this time there was widespread marine transgression and sea level was 3 m above the present level. Due to vast expanse of shallow sea, the sea waves were about 1 m high. These conditions in the Indian subcontinent would mean that a significant portion of Rann was submerged and the erstwhile Sarasvati River was draining into the sea somewhere along the now non-existent palaeo-coastline of the Arabian sea. The warm spell continued till 3500 BC and then gradual cooling and aridity set in. The period from 6,000 BC to 4,000 BC was the best for the development and fructification of Human Civilization. It appears that this was the time when Vedic Civilization prospered in the Indian subcontinent.

Investigations carried out at Kalayat in Haryana confirm the presence of a mighty palaeo-river which brought sediments from the Higher Himalayan peaks. A buried river bed about 2 km in width, near the Vedic location of the mythical Sarasvati River is a very significant evidence which supports the probable presence of erstwhile Sarasvati river channel near Kurukshetra. The sub-surface bore hole geology based on lithological succession reveals a predominance of sand layers after about 7 m to 9 m of

upper mud layer. The sand layers thicken out towards the depth with occasional *kankar* beds intervening with the sand-mud intercalated layers. This lithology supports the presence of a mega-river in its vicinity.

The present ground investigations alongwith Remote Sensing studies carried out by the author suggest that a major river system existed in the northwestern Ghaggar plains of Punjab, Haryana and Rajasthan. Satluj River probably joined this river system in the Himalayan terrain along with the Ashni and Giri rivers. The Yamuna, the Tons and the Bata rivers flowed though the Markanda River and joined the Ghaggar River system. All these rivers, together, probably constituted the erstwhile palaeo-mega river which has been termed in the Vedas as the Sarasvati River. The five rivers of Punjab, including the Satluj, probably drained into this river till about 5 m.a. Subsequently, due to massive tectonic activity which affected the Lesser Himalayas and the adjoining fluvial plains, river system got reorganized. Clift and Blusztajn (2005) on the basis of seismic reflection data obtained from drill core samples from the Arabian sea and Neodymium isotope data suggested that there was a shift in the source of Indus River sediments at 5 m.a. The major source of the detritus in the Indus before 5 m.a. was weathering products of rocks constituting the Indus Suture Zone and the rocks exposed north of it. Subsequently, the Indus River started receiving detritus from the southern part of the Himalayas. This feature suggests a rerouting of the Punjab rivers in such a manner that instead of flowing towards east, the rivers due to change in ground slope, started westward migration and joined the Indus River. Due to uplift of the wedge shaped landmass referred to above, the Ashni and Giri rivers started flowing westward along the newly created valley to join the Yamuna River which by then had breached the frontal Siwalik hills in the form of Yamuna Tear Fault, to pursue a course independent of the Markanda River. Beek *et al.* (2006) suggest the exhumation of Frontal Siwalik hills along the Himalayan Frontal Thrust around 2 m.a. Due to change in basement profile, a part of the erstwhile Markanda River channel inverted its flow direction and water started flowing in the newly created Bata stream in the direction of the Yamuna River. The Satluj River, also took a U-shaped bend near Ropar in Punjab, and pursued a course independent of the Ghaggar River. Thus, the Markanda and the Ghaggar rivers were reduced to the status of seasonal rivulets. Numerous evidences of the presence of huge amount of water in these channels in the form of vertical river cut cliff faces measuring about 50 m in height (Chaudhri, 2002), 2 m to 3 m high pillar like remnants of Pinjore sandstones and clays in ephemeral streams and huge thickness of fluvial gravels in the piedmont reach of the Ghaggar River, are available,

and these strongly suggest that it was a major river in the very near geologic past. The alluvial fans of these rivers extend for a distance of about 9 km to 18 km away from the hills towards the Punjab and Haryana alluvial plains again indicating their erstwhile magnitude.

Sarasvati River is not flowing today, but its buried channel exists. The palaeochannel of Sarasvati River holds the key for mitigation of water scarcity in the region. If the river was trans-Himalayan in character, as it appears to be, then possibilities of finding rich precious metal placer deposits are very bright. Search for the palaeochannels of Sarasvati River and associated deposits is a scientific pursuit, which has immense benefits. Establishment of Quaternary stratigraphy in the Indo-Gangetic alluvial plains and dating of sediments and water by appropriate techniques shall help in increasing the confidence limits of the present inferences.

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Abstracts

The Lost River Sarasvati: Geological Evidence*

K.S. Valdiya

A major river known as the Sarasvati and formed by the confluence of the Shatadru (= Satluj) and the Yamuna (of the past) flowed through Haryana, southern Punjab, northwestern Rajasthan and eastern Sindh and emptied itself in the Gulf of Kachchh. This river was much revered by.the Rigvedic scholars; and it nurtured the Harappan Civilization until it disappeared during the Late Holocene time 3000 to 4000 yr BP. The disappearance of the Sarasvati is a case of river piracy by branches of the Ganga and the Sindhu rivers.

Weaving together various threads of evidence adduced from archaeological, geomorphological and drainage-related studies, and gleaning relevant information from Satellite imageries, it is surmised that the Sarasvati River rose in the snowy realm of the Himadri in northwestern Uttarakhand, flowed south-west through one of the tributaries of the present-day Ghaggar River of the foothills and met the then south-east flowing Shatadru (Satluj) at Shatrana about 15 km south of Patiala. At the confluence, the channel was 6 to 8 km wide, pointing to a very high discharge of the Sarasvati. The Ghaggar River is known as the Hakra in its middle reaches and as the Nara in the lower reaches. Significantly, the groundwater recovered in the middle reaches from tubewells deeper than 60 m was found to be 22000 to 6000 years old, whereas in the shallow-well water carbon has

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been dated at 5000 to 1800 years. The age of the water increases downstream from Kishangarh. Since the tritium value is negligible, these waters do not represent the rainwater fed through contemporary recharge by rainwater. The deeper – and older – water must be attributed to the ancient river that flowed in the time earlier than 5000 yr BP.

Western Rajasthan was dotted with the settlements of the Stone Age people. Parts of Rajasthan, Gujarat and Sindh were inhabited by the people of the Harappan culture (7000 to 3300 yr BP). More than 2000 settlements, including those of the Harappan culture and the *ashrams* of sages of the Vedic time, lay on the banks of the river Sarasvati that discharged into the Gulf of Kachchh. The *Ṛgveda* describes Sarasvati River in glowing terms – "Breaking through the mountain barrier" this "swift-flowing tempestous river surpasses in majesty and might all rivers of the land".

Tectonic uplift along the NE-SW trending fault-delimited blocks of the Aravali Range caused the deflection of the headwaters of the Yamuna and the Shatadru, leading to the disappearance of this mighty river. The eastern branch deviated southwards around 3,700 yr BP, flowed through the channel of a tributary of the Chambal – what is now the Yamuna – and joined the Ganga at Triveni or Allahabad. The consequent dwindling of the river discharge propelled the migration of the Late Harappan (3900-3300 yr BP) people upstream from the Ganganagar-Bahawalpur area to the upper reaches in the Siwalik. This is evident from a dramatic increase of the Late Harappan settlements in the Siwalik belt in southeastern Himachal Pradesh and the adjoining Haryana and Uttar Pradesh. As a matter of fact, this foothill region became populated for the first time.

Later, during the time of Gautam Buddha (who lived in the east about 2600 yr BP), the Shatadru River also betrayed the Sarasvati, as it abruptly swerved westward to join the Beas of the Sindhu system. Deprived of the waters of these two major rivers, the Sarasvati became a dry channel. The collapse of the Harappan Civilization seems to be wholly due to the disappearance of the Sarasvati and its associated rivers.

As tectonic activity continued to afflict the region, there were frequent disruptions, including changes in the river courses. However, some water of the Himalayan rivers continued to flow into the Hakra-Nara channel until about AD 1245 when there was a great migration of the desert people out of the region. The Satluj ceased to contribute water in AD 1593 when it changed its course finally. It was not only the Satluj that was moving westwards, but also all rivers of the Sindhu system, including the Sindhu itself, have shifted westwards. The Sindhu migrated 160 km westwards in the historical times.

Sarasvati River – No More a Debatable Issue

Darshan Lal Jain

Sarasvati a majestic river, after originating in Himalaya flowed in almost south-westerly direction through present day Haryana, Punjab, Rajasthan and Gujarat prior to joining the Arabian Sea. Ancient Vedic culture flourished on its banks. Important towns like Kurukshetra, Pehowa, Shatrana, Sirsa, Kalibangan, Pilibangan, Suratgarh, Beriwal, etc. flourished on its banks. Ample references pertaining to this river are available in *Ṛgveda* as 'ambitame, devitame and naditame'. Our former President Dr. A.P.J. Abdul Kalam was very excited on seeing a photograph of the River with water and he endorsed his reaction in our visitors' book as 'Delighted to see the hard work in realizing reality from epic information. - A.P.J. Abdul Kalam'.

Adi Badri Terrace is a recent discovery in Adi Badri area, located just south of Siwalik hills, almost 30 km north of Jagadhri. Excavations were carried out by Archaeological Survey of India on western bank of Somb River. Angular shaped pebbles of high grade metamorphic rocks and quartzite embedded on the wall were observed in ABR-II excavation site. This alien lithology generated tremendous interest as this terrace is situated south of Siwalik hills in Haryana plains. According to Dr. V.M.K. Puri, ex-Director GSI, Vedic Sarasvati entered plains at Adi Badri area which can be called as Haridwar of Vedic Sarasvati.

Recently, subsurface water started oozing out within a pond of the famous Kapil Muni Ashram in Kalayat (Haryana). A multi-disciplinary scientific team studied the oozing water and the sand that accompanied it. Dr. A.R. Chaudhri of Kurukshetra University found a suite of angular heavy minerals having their source in higher Himalayan rocks. Dr. A.K. Gupta & Dr. B.K. Badra of ISRO identified fossil valleys of Vedic Sarasvati in the

area from the study of space imageries and concluded that this water was of aforesaid river. Sh Rajesh Purohit conducted geomorphologic studies and concluded that this water belonged to Vedic Sarasvati that has been described in *Ṛgveda* and other scriptures. Later on, he along with his team discovered the actual river bed near Jyotisar (Kurukshetra).

During the course of scientific studies carried out from space imageries, scientists from ISRO discovered a number of fossil valleys restricted to areas around Kurukshetra, Pehowa, etc. in upper central Haryana. They interpreted it as remnants of the meandering Vedic Sarasvati. Based on Satellite imagery, they have drawn out a map of Sarasvati River from Glacier to Rann of Kachchh.

Dr. M.R. Rao, GGM, ONGC along with his team, undertook drilling near Jaisalmer in Rajasthan and got a discharge of 76000 litres/hr. of water from one of the wells. Out of 24 wells, drinking water was obtained from 23 wells. Scientific tests on this subterranean water revealed that this water belonged to an old river that once existed here. This old river was none other than Vedic Sarasvati.

Besides the above geological and other scientific evidences, village-wise revenue record has been collected and compiled proving the flow of Sarasvati Nadi in continuity. Survey of India topo-sheets tally with these revenue records. Based on these revenue records, about 50 km of Sarasvati channel has already been cleared by digging by Haryana Irrigation Department.

The writer visited the archaeological sites at Kunal (District Fatehabad, Haryana) and amazingly found shells in the river bed. A friend of archaeology showed a conch recovered from Rakhigarhi (Dist. Jind, Haryana) excavation.

Folkore is an important factor to be considered for establishing a fact. *Shrimad Bhagavat* was penned by Maharishi Ved Vyas at Badrayan, i.e. Adi Badri. Every year more than 10 lakh pilgrims from north India visit Kapalmochan for bathing in crescent shaped Sarovar on Karthik poornima. 15 km downstream of Adi Badri lies the town of Vyaspur (presently Bilaspur), the adobe of Maharishi Ved Vyas. On the outskirts of the town *naga sadhus* used to bathe in Sarasvati Kund alongside a perennially flowing Sarasvati channel. Every evening *arti* is performed at Sarasvati Kund in Sarasvati Nagar (presently Mustfabad, Distt. Yamuna Nagar). You can see people of surrounding villages performing last rites (*asthi visarjan*) of their dead at 'Sangam' of Sarasvati and Somb Nadi at Adi Badri.

'Unfortunately in spite of the overwhelming ambience and public demand, the Govt. took no steps to revive the River. The matter was brought

before the Hon'ble High Court, Haryana-Punjab at Chandigarh through a Civil Writ Petition (CWP8561 of 1996) by Shri D.P. Dastoor an advocate of Pehowa (Kurukshetra), Hon'ble Justice Amarjeet Chaudhary passed the order:

"... we direct Deputy Commissioner Kurukshetra and the Municipal Committee Pehowa to remove all encroachments from the land entries of which are in favour of Sarasvati river..."

Unbelievably, all encroachments were removed voluntarily without any use of force. The monumental work of Govt. & Public co-operation at Pehowa has been beautifully documented by the District Administration in a souvenir (*samarika*).

Thus, all the evidences mentioned above point to only one conclusion that Vedic Sarasvati no longer remains a debatable issue.

Bibliography

BACKGROUND

In the search for clues to the peopling of India in ancient times, many theories have been put forward. During the British colonial regime, a theory called Aryan Invasion Theory was proposed to explain the roots of the Indo-European languages and common lexemes found among European and Indian languages. This theory was modified as Aryan Migration/Trickle-in Theories.

After India gained independence, and taking into account the archaeological discoveries reported particularly from Northwestern India and Pakistan, the reliability of this theory was questioned by many scholars and researchers. The problems related to the decipherment of the Indus Script have also resulted in many theories related to the formation and evolution of ancient languages of India. The discovery of the ancient courses of Vedic River Sarasvati and a large number of archaeological sites on this river basin in Northwestern India have led some to suggest that the civilization should be called Indus-Sarasvati Civilization. Relating archaeological discoveries and language studies (including the so-called Indus Script problem) is a challenge which calls for many multi-disciplinary researches to delineate the peopling of India and the roots of Hindu culture during ancient periods from ca. 4th millennium BCE.

The following is an indicative list of recent works on the subject which necessitate a restatement of the indigenous/autochthonous evolution of Hindu Civilization.

The Conference being held between Oct. 24 to 26 on Vedic River Sarasvati and Hindu Civilization is intended to focus on this research area to delineate the roots of Hindu culture and civilization. The discovery and rebirth of River Sarasvati result in a perspective to underscore the continuum evidenced by many cultural indicators such as the practice of wearing *sindhur* at the parting of the hair by married women, worship of *Shivalinga*, *pushkarinis*, veneration of *śankha* (turbinella pyrum) which is an 8500 year old continuing industry, metallurgical techniques of making

bronze statues and veneration of River Sarasvati as mother and as a divinity. Such indicators call for further researches to provide a fair account of socio-cultural history of India.

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